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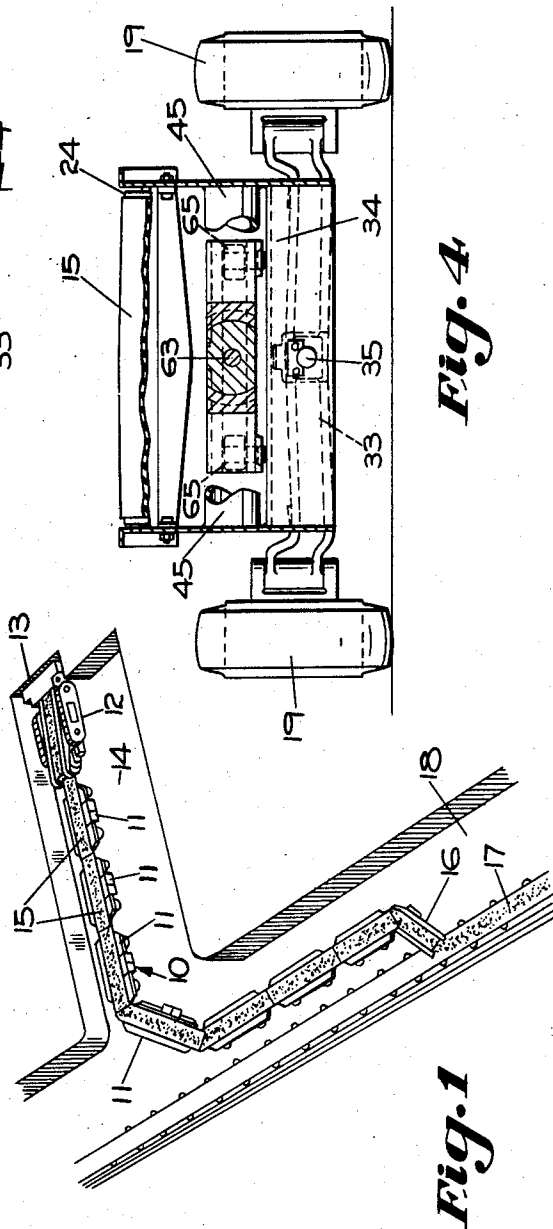
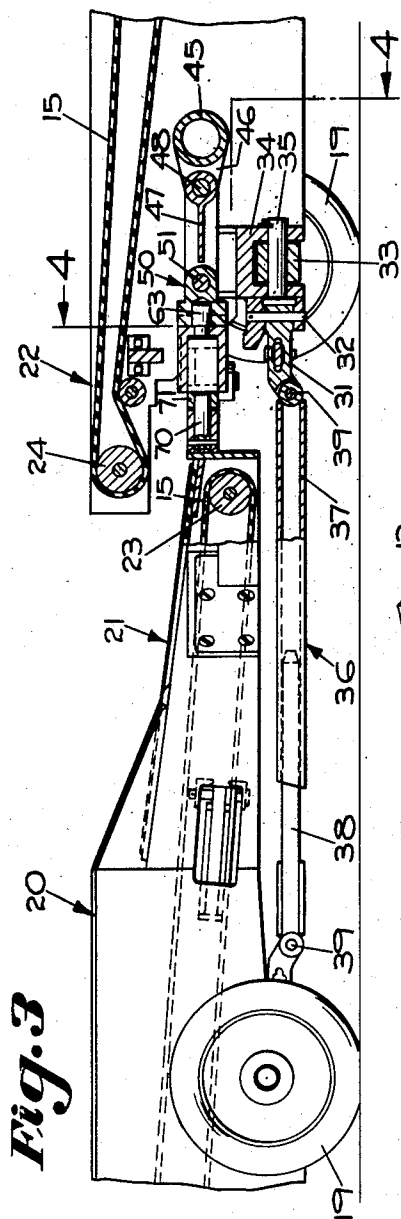
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HITCH FOR MOBILE CONVEYOR

Filed March 20, 1957

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

**Fig. 2**

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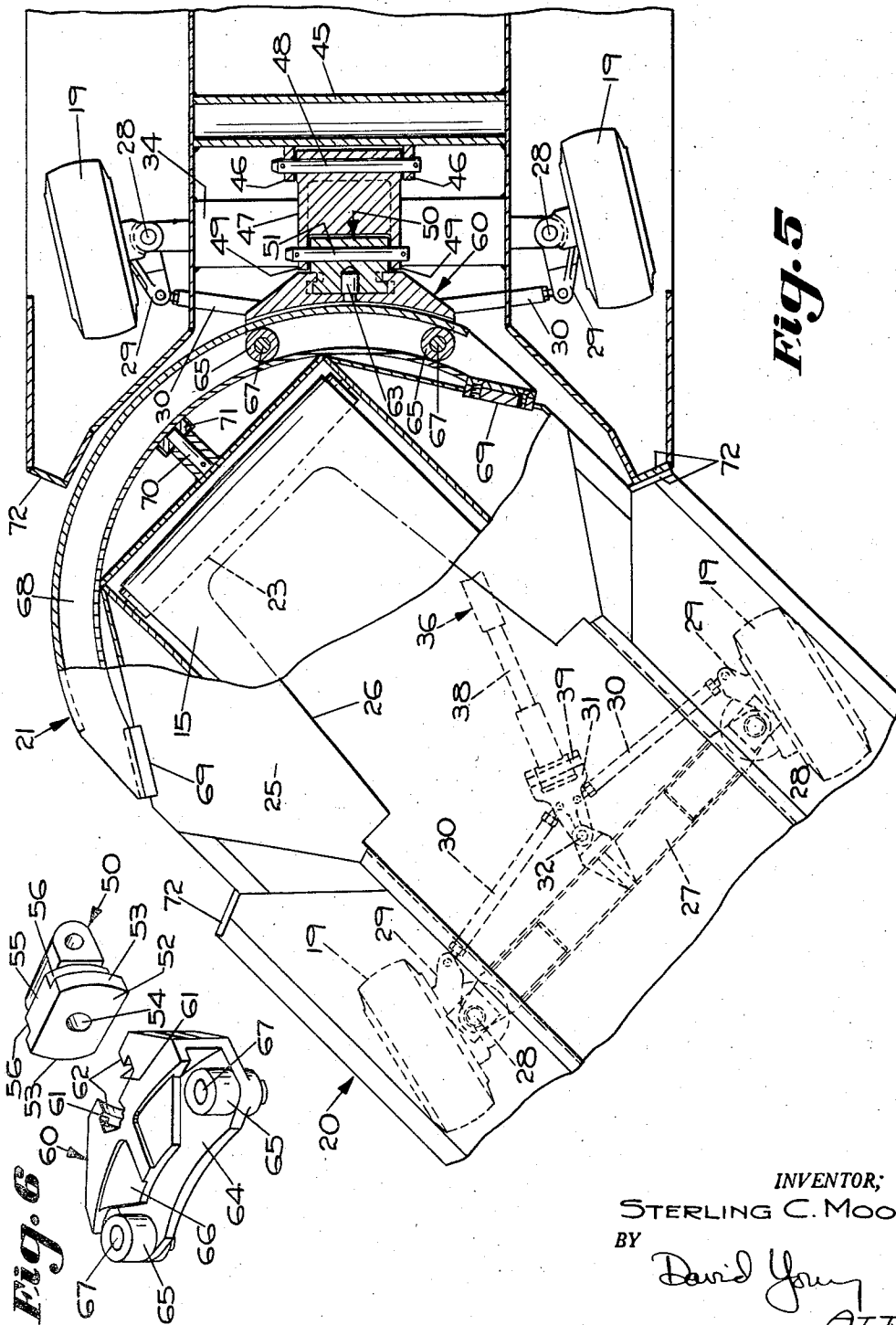
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3 Sheets-Sheet 3



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1

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## HITCH FOR MOBILE CONVEYOR

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The instant invention relates to mobile conveyors, and more particularly to a conveyor comprising a plurality of individual cars connected one to the other in a train and each having a conveying means for moving material the length of the car and discharging the material to a subsequent car to be similarly moved, and in which adjacent cars comprise novel hitching means connecting the adjacent cars and permitting the cars to swing laterally relatively to each other to assume positions in a winding path.

It is the prime object of this invention to provide a conveyor comprising a plurality of individual cars connected to each other in a train and including novel hitch means connecting adjacent cars, and permitting said cars to swing laterally relatively to each other to dispose the cars in laterally displaced positions relatively to each other in a winding path.

It is another object of the instant invention to provide a conveyor comprising a plurality of individual cars connected to each other in a train, and including novel hitch means connecting adjacent cars for adjustment of the positions of the cars relatively to each other in an upright plane.

It is a further object of the instant invention to provide a conveyor comprising a plurality of individual cars connected to each other in a train, and including novel hitch means comprising connecting means adapted to rotate about a longitudinally extending axis for adjustment of the positions of the cars relatively to each other about said axis.

It is also an object of this invention to provide a conveyor comprising a plurality of individual cars connected to each other in a train, and including novel hitch means connecting adjacent cars and comprising means for constraining the cars to swing laterally relatively to each other to dispose the cars in laterally displaced positions relatively to each other in a winding path.

It is still another object of the instant invention to provide a conveyor comprising a plurality of individual cars connected to each other in a train, and including novel hitch means connecting adjacent cars to swing laterally relatively to each other, and in which the cars are coupled to follow each other in a winding path to be disposed in laterally displaced positions relatively to each other.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawings:

Fig. 1 is a diagrammatic view showing the operation of a mobile conveyor embodying the instant invention;

Fig. 2 is a top plan view showing portions of two adjacent cars of the conveyor embodying the instant invention;

Fig. 3 is an elevational view, partially in section, showing two adjacent cars of the mobile conveyor embodying the instant invention;

2

Fig. 4 is a vertical sectional view taken on line 4—4 in Fig. 3;

Fig. 5 is a plan view, partially in section, of two adjacent cars of the mobile conveyor embodying the instant invention, showing the cars disposed in laterally displaced positions relatively to each other; and

Fig. 6 is a perspective view showing two elements of the novel hitch of this invention.

This invention relates to a novel hitch means for connecting adjacent cars of a mobile conveyor in which the cars are adapted to be connected one to the other in a train, and in which the cars are adapted to swing laterally with respect to each other to assume laterally displaced positions relatively to each other in a winding path. Referring to Fig. 1, there is diagrammatically illustrated a mobile conveyor 10 embodying the instant invention and comprising a plurality of individual cars 11 connected one to the other in a train. The mobile conveyor 10 is particularly adapted for use in mining operations, in which a continuous mining machine 12 is advanced into the face 13 of a mine room 14 to remove material from the face 13. The conveyor 10 is adapted to follow the mining machine 12 as it advances into the face 13, and the material removed from the face 13 is discharged onto the conveyor belt 15 of the first car 11 in the conveyor 10. The conveyor belt 15 of the first car 11 is adapted to move the material the length of the car 11, and to discharge the material onto the like conveyor belt 15 of the next succeeding car 11 in the train, and so on, until the material reaches the discharge boom 16 of the conveyor 10, which discharges the material onto a main conveyor belt 17, which runs in the mine passageway 18 and removes the material from the mine.

Referring now to Figs. 2 and 3 wherein the cars 11 of the mobile conveyor 10 are illustrated in greater detail, it is seen that each car 11 comprises a main frame 20 formed with a material receiving end 21 and a material discharging end 22. Only the adjacent portions of two of the cars 11 are illustrated in the drawings, and it will be understood that each car 11 comprises a material receiving end 21 and a material discharging end 22, which in each case is of the same construction. The conveyor belt 15 runs along the length of the car 11 and is trained about a tail pulley 23 at the material receiving end 21, and about a head pulley 24 at the material discharging end 22.

The conveyor belt 15 runs from the material receiving end 21 to the material discharging end 22 on a rising incline so that the conveyor belt 15 at the material discharging end 22 is disposed above the conveyor belt 15 at the material receiving end 21 of the next succeeding car 11, whereby the material falls off the conveyor belt 15 of one car onto the conveyor belt 15 of the next succeeding car. The material receiving end 21 of each car 11 is formed with an apron 25 overlying the conveyor belt 15 and having an opening 26 under which the conveyor belt 15 runs, with the material falling into the opening 26 and onto the conveyor belt 15 running therebelow, for removal of the material from the receiving end 21 to the discharging end 22. It will be understood by those skilled in the art that suitable drive means is provided on each car 11 for operating the conveyor belt 15 in the manner described.

Each of the cars 11 is supported on two pairs of steerable wheels 19, disposed one pair at each end of the car 11, for moving the cars 11 along a winding path through the mine. The pairs of steerable wheels 19 on the adjacent ends of the cars 11 are coupled to cause the wheels 19 on the adjacent ends of the cars 11 to be steered together, whereby the succeeding cars will follow each other in the winding path, as will be explained in greater detail hereinafter. Each of the cars 11 also

includes individual power means for driving one pair of the wheels 19 and for driving the conveyor belt 15, and not illustrated in the drawings since it forms no part of the instant invention.

The wheels 19 at the material receiving end 21 of the car 11 are mounted on the opposite ends of a laterally extending axle 27 which is fixed relatively to the main frame 20 of the car 11. The individual wheels 19 are secured to the opposite ends of the axle 27 by a vertical pin 28, which permits the wheels 19 to be steered on the axes of the pin 28. The assembly of each of the wheels 19 on an end of the axle 27 includes a crank 29 to which there is pivotally secured one end of a steering link 30. The inboard ends of the steering links 30, at the longitudinal center of the car 11, are pivotally secured to a link 31, which is secured by a pin 32 to the axle 27. Thus by oscillation of the link 31 about the axis of the pin 32, the steering links 30 are caused to operate the cranks 29 and thereby steer the wheels 19.

The wheels 19 at the material discharging end 22 of the car 11 are mounted on the opposite ends of an axle 33 which is secured to the main frame 20 in a channel housing 34 by means of a longitudinally extending pin 35. The axle 33 is thereby mounted for oscillation relatively to the main frame 20 about the axis of the pin 35. With the construction of the axles 27, 33 as described herein, wherein the wheels 19 on the material receiving end 21 of the car 11 are mounted on a fixed axle 27, and the wheels 19 at the material discharging end 22 are mounted on an oscillatable axle 33, the car 11 is in effect supported on three points and will adjust to the uneven supporting surface normally found in the mine, to support the car in a stable position.

The wheels 19 at the material discharging end 22 include steering means like that described in connection with the wheels 19 on the material receiving end 21, and is so indicated by like reference numerals in the drawings. The links 31 for steering the wheels 19 on adjacent ends of connected cars 11 are coupled to each other by means of a telescoping rod 36, which comprises a hollow portion 37 and a complementally formed solid portion 38, which is insertable into the hollow portion 37 and is adapted to slide relatively thereto as the cars 11 are steered or swung relatively to each other. Each of the opposite ends of the rod 36 is connected to the link 31 on the adjacent cars 11 by means of a transversely extending pin 39 which permits adjustment of the positions of the adjacent cars 11 relatively to each other in an upright plane, such provision being necessary due to the uneven surface of the mine floor.

The main frame 20 at the discharging end 22 includes a transversely extending frame member 45 formed with a pair of laterally spaced lugs 46 between which there is pivotally secured a hitch link 47 by means of a transversely extending pin 48. The opposite end of the hitch link 47 is formed with laterally spaced apertured arms 49 between which there is placed a hitch swivel 50. The hitch swivel 50 is connected to the hitch link 47 by a pin 51 which permits adjustment of the positions of the hitch link 47 and the hitch swivel 50 in an upright plane, and thereby provides for adjustment of the positions of the adjacent cars 11 relatively to each other in an upright plane.

The hitch swivel 50 extends beyond the arms 49 of the hitch link 47, and is formed with a swivel portion 52 having laterally extending tongues 53 on each side thereof which are formed on the circumference of a circle having as its center a point on the axis of a cylindrical bore 54 in the swivel portion 52 of the hitch swivel. Immediately behind the tongues 53 on each side of the hitch swivel 50, there are formed inwardly offset surfaces 56, also formed on the circumference of a circle having a point on the axis of the cylindrical bore 54 as its center, this circle being of smaller radius than the first mentioned circle. The top and bottom of the swivel portion 52 are

formed with flat surfaces 55 formed on chords of the circles on which the tongues 53 and the inwardly offset surfaces 56 are formed.

A hitch clevis 60 is connected to the hitch swivel 50 and forms a connecting means for the adjacent cars 11. The rear of the hitch clevis 60 is formed with a pair of arcuate grooves 61 formed behind arcuate shoulders 62. The arcuate surfaces of the grooves 61 are complementally formed with respect to the arcuate surfaces of the tongues 53, and the arcuate surfaces of the shoulders 62 are similarly complementally formed with respect to the arcuate inwardly offset surfaces 56 behind the tongues 53 on the hitch swivel 50.

The tongues 53 and the inwardly offset surfaces 56 on the hitch swivel 50 interlock with the grooves 61 and shoulders 62 on the hitch clevis 60. The hitch clevis 60 also includes a rearwardly extending pilot pin 63 which is seated in the bore 54 of the hitch swivel 50. The hitch swivel 50 and hitch clevis 60 may thereby rotate relatively to each other, with the complementally formed interlocking portions thereof serving to guide such relative rotation about the longitudinally extending axis of the pilot pin 63.

The vertical distance between the top and bottom flat surfaces 55 on the swivel portion 52 is less than the shortest lateral distance between the shoulders 62 on the hitch clevis 60, whereby the hitch swivel 50 and hitch clevis 60 may be assembled by rotating the parts 90 degrees relatively to each other and placing the swivel portion 52 in the space between the grooves 61 and the shoulders 62 on the rear of the hitch clevis 60, and then rotating the parts 90 degrees relatively to each other in the opposite direction until the hitch swivel 50 and the hitch clevis 60 are disposed relatively to each other as illustrated in Fig. 6, with the exception that the elements 50, 60 will be interlocked. This construction of the hitch swivel 50 and the hitch clevis 60 permits adjustment of the positions of the cars relatively to each other about the longitudinal axis on which the hitch swivel 50 and hitch clevis 60 rotate relatively to each other.

The front of the hitch clevis 60 is formed with a bottom plate 64 the opposite ends of which each supports a roller 65 rotatably mounted on a fixed pin 67. The laterally spaced apart rollers 65 form a guide which engages an arcuate track 68 on the adjacent car 11. The track 68 is of an inverted channel form having its opposite ends secured to the main frame 20 of the car 11 by suitable plate and screw means 69. At a position centrally disposed with regard to the length of the track 68, there is provided a rearwardly extending pin 70 secured to the main frame 20. The track 68 has secured thereto a boss 71 into which the pin 70 is inserted for the purpose of providing additional support for the track 68. The clevis 60 includes a top plate 66 formed above the bottom plate 64 and adapted to overly the track 68 for the purpose of maintaining the track 68 in assembly with the hitch clevis 60, and eliminating vertical movement of the track 68 and the hitch clevis 60 relatively to each other.

The track 68 is formed on the circumference of a circle having its center disposed between the adjacent cars 11, and the guide rollers 65 cooperate with the track 68 to constrain the adjacent cars 11 to swing laterally relatively to each other in accordance with the arcuate path defined by the track 68. Since the steerable wheels 19 on the adjacent ends of the cars 11 are coupled to each other by the rod 36, so that the wheels 19 on the adjacent cars 11 are steered together, the cars will follow each other in a winding path through the mine, as illustrated in Fig. 1, and the guide rollers 65 in cooperation with the track 68 will constrain the lateral swinging movement of the adjacent cars to maintain the conveyors 15 of adjacent cars 11 in proper position relatively to each other for discharge of material from one conveyor 15 to the other. The lateral swinging movement of the adja-

5

cent cars 11 is limited by angularly disposed abutment plates 72 formed on the main frame 20 of each car 11, one on each side of the car 11.

In accordance with this invention there is provided a compact hitch structure for connecting adjacent cars of the mobile conveyor. The novel hitch is disposed within the main frames of the adjacent cars so that these cars may be placed closely adjacent one another in the train of cars, for efficient operation in discharging material from the conveyor belt of one car onto the conveyor belt of a succeeding car. The novel hitch means connects the cars for lateral swinging movement relatively to each other so that the cars may be disposed in laterally displaced positions relatively to each other in a winding path, and additionally, the hitch includes means providing for adjustment of the positions of the cars relatively to each other in an upright plane and about an axis extending longitudinally of the cars.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and applicant therefore wishes not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of the invention, what it is desired to secure by Letters Patent of the United States is:

1. In an apparatus having at least two cars in a train with an end of one car disposed adjacent an end of another car, hitch means joining the adjacent ends of the cars one to the other in the train and permitting movement of the cars relatively to each other, said hitch means comprising connecting means connected to one car and including a longitudinally extending pivot means for adjustment of the positions of the cars relatively to each other about the axis of said pivot means, said connecting means including a guide, an arcuate track on the other car formed with a downwardly opening channel cross-section, said guide including means engaging the track within the channel cross-section at spaced points for guiding the movement of the adjacent ends of the cars relatively to each other in accordance with the arcuate path defined by the track and constraining the cars to swing laterally relatively to each other, said guide also including an integral top plate overlying the track and supporting the connecting means on the track in planar alignment with the track.

2. In an apparatus having at least two cars in a train with an end of one car disposed adjacent an end of another car, hitch means joining the adjacent ends of the cars one to the other in the train and permitting movement of the cars relatively to each other, said hitch means comprising connecting means connected to one car and including a hitch swivel and a guide, said hitch swivel and said guide including interlocking portions joining the guide to the hitch swivel on a longitudinally extending axis, said interlocking portions including complementally formed surfaces permitting rotation of the hitch swivel and the guide relatively to each other about said longitudinally extending axis for adjustment of the positions of the cars relatively to each other about said axis, an arcuate track on the other car formed with a downwardly opening channel cross-section, said guide including means engaging the track within the channel cross-section at spaced points for guiding the movement of the adjacent ends of the cars relatively to each other in accordance with the arcuate path defined by the track and constraining the

6

cars to swing laterally relatively to each other, said guide means also including an integral top plate overlying the track and supporting the hitch swivel and the guide on the track in planar alignment with the track.

3. In an apparatus having at least two cars in a train with an end of one car disposed adjacent an end of another car, hitch means joining the adjacent ends of the cars one to the other in the train and permitting movement of the cars relatively to each other, said hitch means comprising a hitch link having one end pivotally connected to the one car on a transversely extending axis for adjustment of the positions of the cars relatively to each other in an upright plane, connecting means pivotally connected to the other end of the hitch link on a transversely extending axis, said connecting means including a hitch swivel and a guide, said hitch swivel and said guide including interlocking portions joining the hitch swivel and the guide on a longitudinally extending axis, said interlocking portions being complementally formed with arcuate surfaces permitting rotation of the hitch swivel relatively to the guide on said longitudinally extending axis for adjustment of the positions of the cars relatively to each other about said longitudinally extending axis, an arcuate track on the other car formed with a downwardly opening channel cross-section, said guide including means engaging the track within the channel cross-section at spaced points for guiding the movement of the adjacent ends of the cars relatively to each other in accordance with the arcuate path defined by the track and constraining the cars to swing laterally relatively to each other, said guide also including an integral top plate overlying the track and supporting the hitch swivel and the guide on the track in planar alignment with the track.

4. In an apparatus having at least two cars in a train with an end of one car disposed adjacent an end of another car, hitch means joining the adjacent ends of the cars one to the other in the train and permitting movement of the cars relatively to each other, said hitch means comprising connecting means connected to one car and including a longitudinally extending pivot means for adjustment of the positions of the cars relatively to each other about the axis of said pivot means, said connecting means including a guide, an arcuate track on the other car disposed on the circumference of a circle and formed with a downwardly opening channel cross-section, said guide including spaced rollers engaging the track within the channel cross-section and adapted to ride along the track for guiding the movement of the adjacent ends of the cars relatively to each other in accordance with the arcuate path defined by the track and constraining the cars to swing laterally relatively to each other, said guide also including an integral top plate overlying the track and supporting the connecting means on the track in planar alignment with the track.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |              |               |
|-----------|--------------|---------------|
| 1,304,276 | De Haeseleer | May 20, 1919  |
| 1,416,989 | Silva        | May 23, 1922  |
| 1,627,998 | Porter       | May 10, 1927  |
| 2,420,009 | Osgood       | May 6, 1947   |
| 2,580,112 | Marchetti    | Dec. 25, 1951 |
| 2,588,283 | Osgood       | Mar. 4, 1952  |
| 2,746,771 | Gross        | May 22, 1956  |
| 2,799,386 | Moon         | July 16, 1957 |