

Jan. 15, 1963

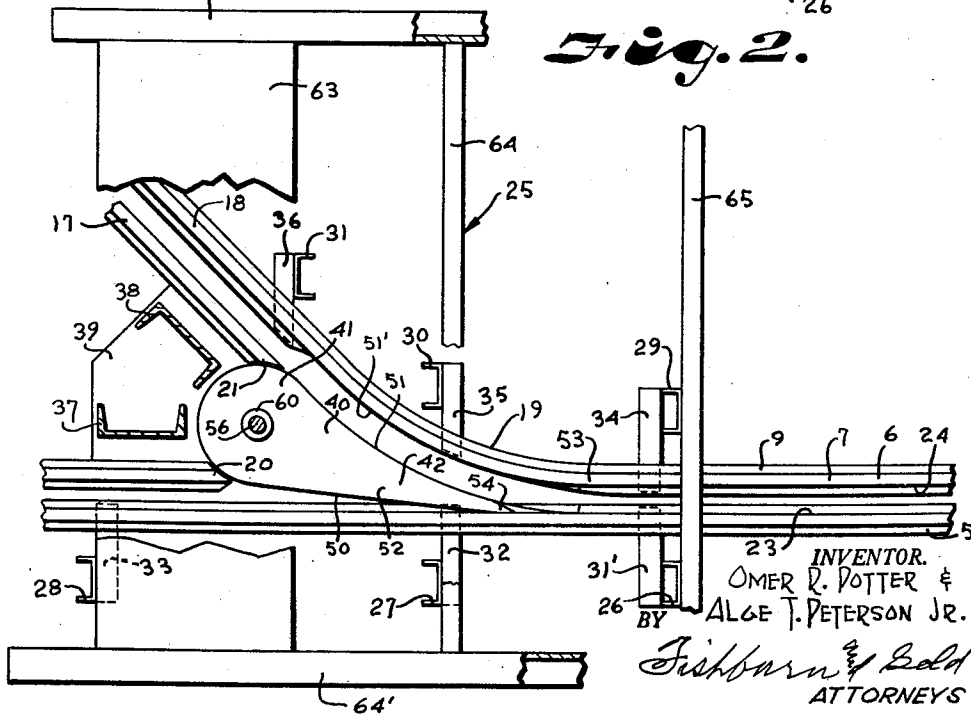
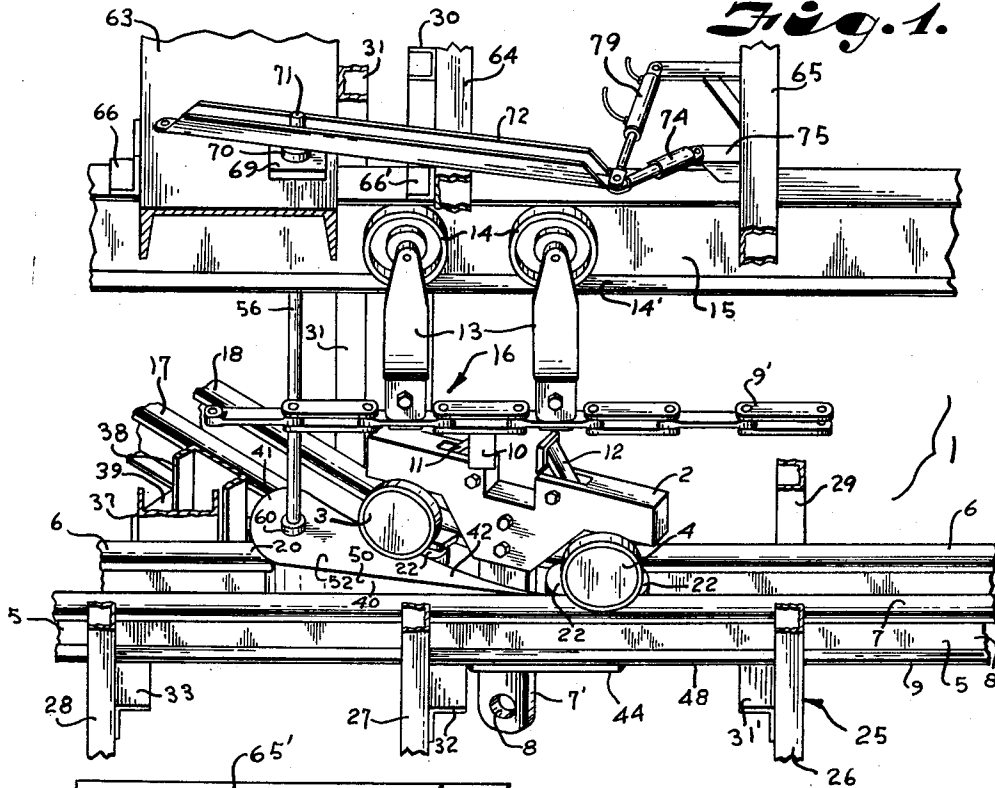
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3,073,259

COMBINATION TROLLEY AND SWITCH

Filed July 3, 1961

3 Sheets-Sheet 1



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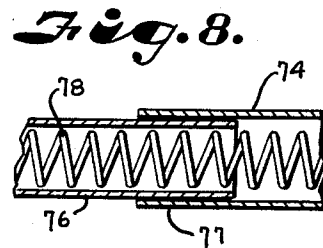
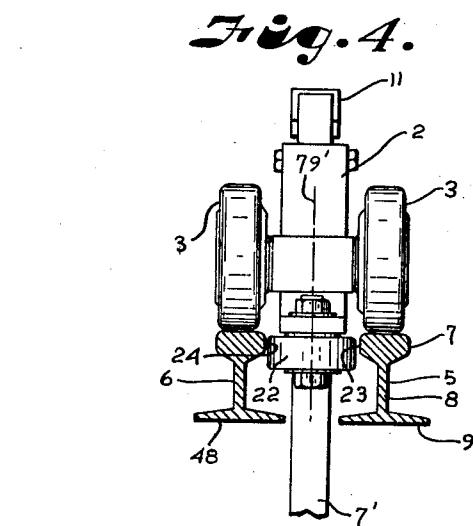
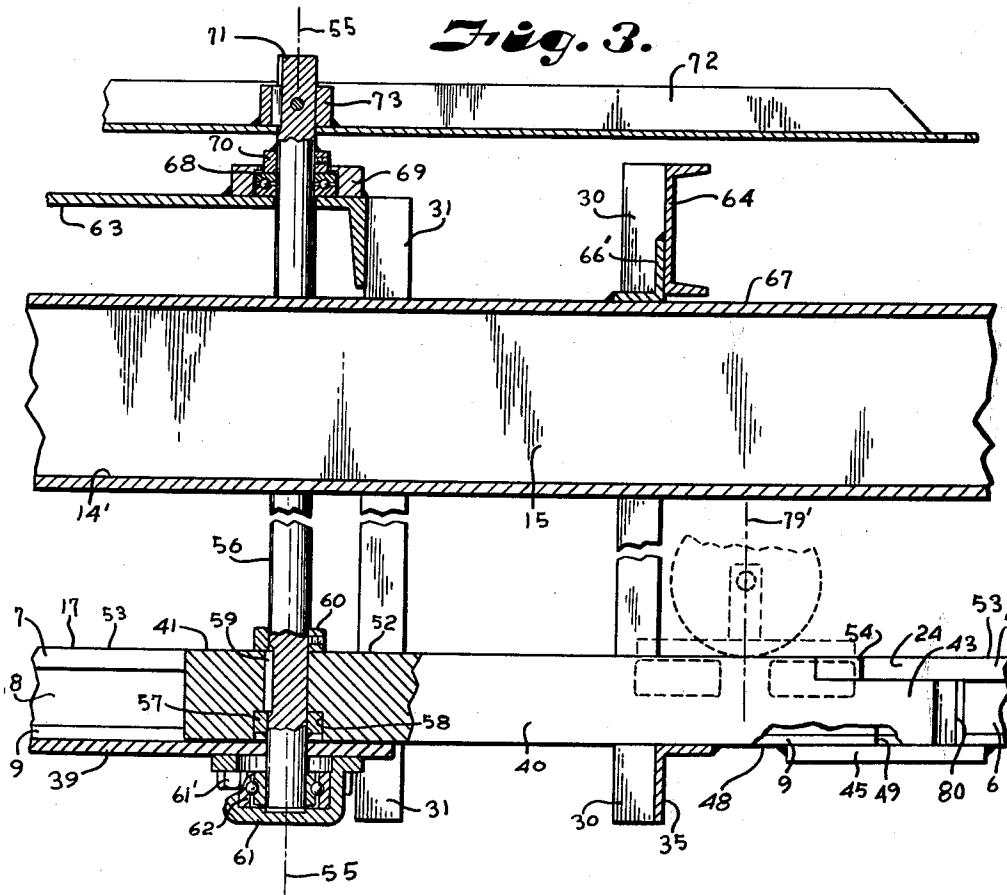
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COMBINATION TROLLEY AND SWITCH

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3 Sheets-Sheet 2



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Fig. 5.

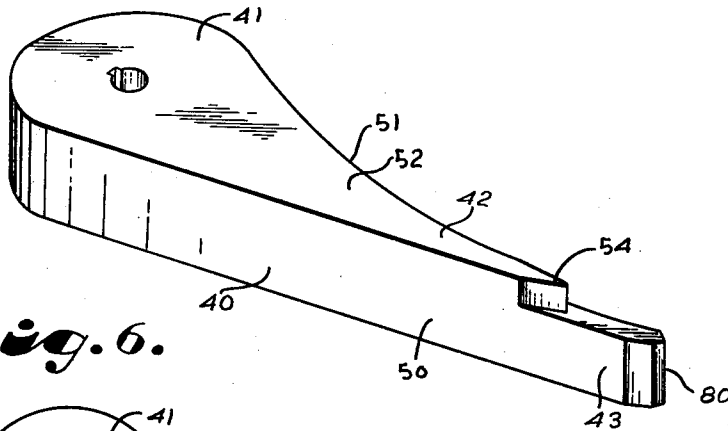


Fig. 6.

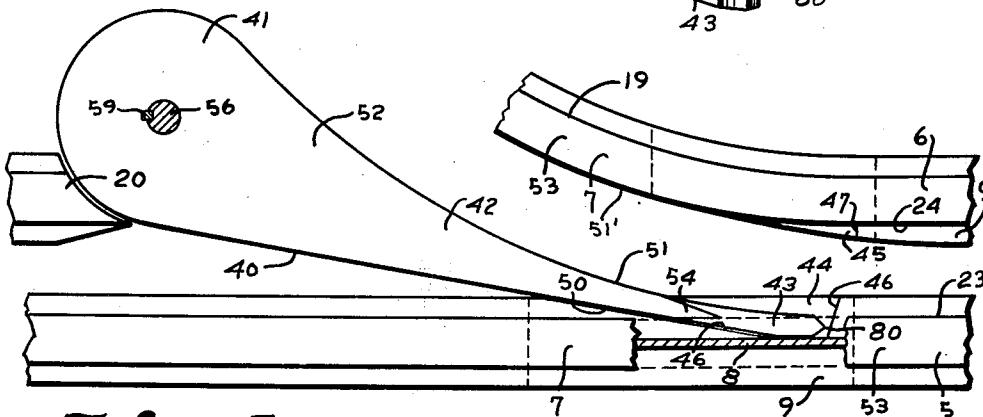
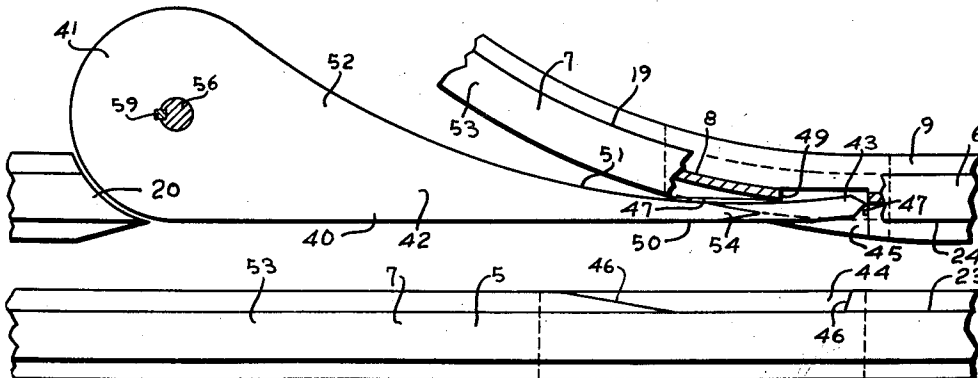


Fig. 7.



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3,073,259

COMBINATION TROLLEY AND SWITCH

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6 Claims. (Cl. 104-104)

This invention relates to switches for power and free conveyor systems and more particularly to a novel trolley switch and supporting structure therefor.

The principal objects of the present invention are: to provide a unique supporting structure for a switch adapted to divert a load carrying trolley from one pair of rails to another which structure permits ease of switch control; to provide a switch and supporting structure of this character which is extremely simple in construction but rugged and reliable in use; to provide such a supporting structure which remains rigid and functional under high loads; to provide a switch tongue which has one end supported against vertical deflection by means of a vertically extending support rod or member pivotally supported on a frame member conveniently spaced a considerable distance above the load carrying tracks and chain track beam so as to avoid congestion in the switching area; to provide such a vertically extending rod or support member which is used to transmit a torque for switching the switch tongue; to provide a switch tongue having guiding surfaces smoothly blending into guiding surfaces on the load carrying rails whereby loads are smoothly transported therealong; to provide receiving portions on respective load carrying rails for receiving the swinging or free end of the switch tongue and including supporting pads affixed to the load carrying rails for supporting the swinging or free end of the tongue under load; to provide a configuration whereby the switch tongue is deflected in either of its respective switch positions by depending guide wheels of the trolleys in the event that the switch tongue has not fully entered into either position; and to provide a switch mechanism wherein the switch tongue is urged to remain in either switching position by an over-center spring toggle device.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example certain embodiments of this invention.

FIGURE 1 is a fragmentary perspective view showing the switch tongue in relation to the supporting frame therefor and a load carrying trolley.

FIGURE 2 is a fragmentary top view showing the switch tongue with portions of the supporting frame in section.

FIGURE 3 is a fragmentary sectional view on an enlarged scale showing details of the switch tongue supporting and controlling members.

FIGURE 4 is an end view of a load carrying trolley supported by spaced rails.

FIGURE 5 is a perspective view on an enlarged scale of the switch tongue.

FIGURE 6 is a top view on an enlarged scale showing the switch tongue in the branch track deflecting position.

FIGURE 7 is a top view on an enlarged scale showing the switch tongue in the straight-through position.

FIGURE 8 is a fragmentary sectional view on an enlarged scale showing details of the switch toggle device.

Referring to the drawings in more detail:

The reference numeral 1 indicates generally a portion of a power and free conveyor system having load carrying trolleys 2 adapted to be driven therealong. The

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trolleys 2 exhibit front load wheels 3 and rear load wheels 4 riding on a pair of spaced load carrying tracks or rails 5 and 6 of the type having a rail head 7, a web 8 and a rail flange 9.

The trolleys 2 include a pendant or load bar 7' extending downwardly between the spaced rails 5 and 6 and adapted to receive a hook (not shown) in a socket or eye 8' for supporting a suitable load (not shown) which may be as high as several thousand pounds. The trolleys 2 are adapted to be driven along the spaced rails 5 and 6 with a continuously driven chain 9' having spaced depending dogs 10 fixed thereto and adapted to engage between upstanding push members 11 and 12 on the trolley 2. The chain 9' is movably supported by a plurality of hangers 13 having wheels 14 engaging the lower flange 14' of a chain track beam 15 spaced upwardly from the rails 5 and 6 and extending substantially parallel thereto, FIGURE 1.

At spaced intervals along the rails 5 and 6 a switch structure or zone such as that indicated generally at 16 is provided through which the trolleys pass for selective switching from the spaced rails 5 and 6 to spaced branch tracks or rails 17 and 18. The illustrated switch structure may also be used to guide a trolley from the branch rails 17 and 18 to the rails 5 and 6, depending on the direction of travel of the chain 9'. It is noted that when the trolley is riding on the rails 17 and 18 the chain dog 10 is disengaged from the push members 11 and 12 and the trolley moves either due to momentum or by auxiliary driving means (not shown).

The switch zone 16 is characterized by a curved portion 19 extending from the rail 6 and which becomes the branch rail 18, as best illustrated in FIGURE 2. The rail 6 which is considered interrupted at the curved portion 19 begins again at a position 20 spaced from the curved portion 19 and continues downstream in its former spaced relation with the rail 5. The rail 17 begins at a position 21 adjacent the rail 18 and picks up the former supporting function of the rail 5 when a trolley 2 is urged around the curved portion 19 onto the branch rail 18.

The trolleys 2 are of the type guided by depending guide rollers 22 thereon which contact and extend below the lateral inside surfaces 23 and 24 of the respective rail heads 7, FIGURE 4. The guide rollers 22 pivot the load wheels 3 and 4 to guide the trolley along the straight and curved portions of the rails.

The switch structure or zone 16 includes a frame generally indicated at 25 for supporting a portion of the rails 5 and 6, a portion of the branch rails 17 and 18 and a portion of the chain track beam 15. The frame 25 is comprised of a plurality of vertically extending members or channels 26, 27, 28, 29, 30 and 31 each having respective extensions or angles 31', 32, 33, 34, 35 and 36 welded thereto and extending laterally therefrom toward the rails. The angles 31', 32 and 33 extend beneath the rail 5 and are welded thereto to provide support therefor. The angle 34 extends beneath and is welded to the curved portion 19 and the angle 36 extends beneath and is welded to the rail 18; each providing support for the respective rail portion. Vertically extending channels 37 and 38 are welded to a plate 39 which extends beneath the rail 17 in the vicinity of the portion 21 and beneath the rail 6 in the vicinity of the portion 20, providing support therefor.

An elongated load-carrying switch tongue 40 is located at what may be termed the junction between the branch rails 17 and 18 and the rails 5 and 6. The switch tongue 40 is shaped to form an enlarged semi-circular end portion 41 and an inwardly tapering body portion 42 extending away from the end portion 41. The body portion 42 terminates in a support leg 43 adapted to be received beneath the respective rail heads of the rails 5 and 6 and

when under load to bear against respective load plates or pads 44 and 45 respectively welded to the flanges 9 of the rails 5 and 6. The pads 44 and 45 are located on the respective rails 5 and 6 immediately beneath rail flange cut-out portions 46 and 47. The flange cut-out portions 46 and 47 permit the support leg 43 to be received beneath the respective rail heads 7 and yet exhibit a vertical thickness which extends to the lower surface 48 of the rail flanges 9.

A portion of the rail 6 is removed or cut-out from the rail web 8 at 49 adjacent the curved portion 19 to permit the support leg 43 to maintain a substantial lateral thickness while presenting an outside lateral surface 50 which smoothly blends into the lateral inside surface 24 of the rail 6, FIGURE 7. As illustrated in FIGURE 6, the body portion 42 of the switch tongue 40 is shaped to present a curved outside lateral surface 51 which smoothly blends into the lateral inside surface 23 of the rail 5 when the switch tongue is located thereagainst. The outside lateral surfaces 50 and 51 of the switch tongue 40 present guiding surfaces for contacting the guide rollers 22 to provide steering for the load wheels 3 and 4 when the trolley 2 is being urged through the switch structure or zone 16. It is noted that a portion 51' of the flange 9 on the curved portion 19 is cut away to provide clearance for the load bar 7' to pass through the curve.

The body portion 42 of the switch tongue 40 has an upper load bearing surface 52 aligning with the load bearing surfaces 53 of the rail heads 7. The load bearing surface 52 terminates adjacent the support leg 43 in a pointed rail head contacting portion 54 shaped so as to provide substantial continuity of support surface for the load wheels 3 and 4 during travel from the rail to the switch tongue.

The switch tongue 40 is rotatable about a vertically extending axis noted at 55 (FIG. 3) and extending through the semi-circular end portion 41. The rotation of the switch tongue 40 is limited between two tongue switch positions determined by the contact of the rail head contacting portion 54 with the respective rails 5 and 6, as illustrated in FIGURES 6 and 7.

A support rod or member 56 is fixed to the switch tongue 40 and extends vertically therefrom coincident with the axis 55. The support rod 56 carries a collar 57 welded thereto and contained within a counter bore 58 extending upwardly from the underside of the switch tongue 40 to provide vertical upward support for the semi-circular end portion 41, FIGURE 3. A vertically extending shaft key 59 is engaged in suitable keyways in the semi-circular end portion 41 and the support rod 56 to provide a locking against relative motion for transmitting torque to the switch tongue 40 through the support rod 56. A suitable collar 60 surrounding the support rod 56 and contacting the surface 52 prevents an accidental upward displacement of the switch tongue 40 with respect to the support rod 56.

The support rod 56 extends downwardly through the plate 39 and into a bearing support housing 61 secured to the plate 39 with bolts 61' and containing a radial support ball bearing 62 for rotatably supporting the support rod or member 56 against lateral motion. Slight clearance is provided between the plate 39 and the switch tongue 40 whereby substantially the entire downward load on the semi-circular end portion 41 is transmitted to the support rod 56.

The vertically extending support rod 56 extends upwardly from the semi-circular end portion 41 past the chain track beam 15 and through a horizontally extending channel 63 forming a portion of the frame 25. The channels 28, 31, 37 and 38 are secured to the channel 63, for example, by welding to provide a rigid structure and vertical support for portions of the rails 5, 6, 17 and 18. Also, horizontally extending channels 64 and 65 form portions of the frame 25 and have the channels 26, 27, 29 and 30 welded thereto for providing additional support

for the rails 5 and 6. The horizontally extending channels 63, 64 and 65 have the ends thereof respectively welded to heavy channels or support members 64' and 65'.

A thrust bearing 68 is operatively connected between the vertically extending support rod or member 56 and the channel 63 for providing pivotal support for the semi-circular end portion 41. The thrust bearing 68 is maintained in place on the channel 63 by a suitable housing 69 secured to the upper surface of the channel 63, for example by welding. A collar 70 is secured to the rod 56, for example, by welding and bears against the bearing 68 to transmit the vertical load on the semicircular end portion 41 to the channel 63. The support rod 56 extends above the collar 70 and terminates in an upper end 71. The end 71 has secured adjacent thereto a channel 72 which acts as a control extension and extends laterally therefrom. The channel 72 is secured to the support rod 56 by means of a collar 73 which is respectively welded to the channel 72 and pinned to the rod 56.

A resiliently biased compressible over-center device 74 has the opposite ends thereof secured respectively to the channel 72 and a lateral extension 75 of the channel 65. The over-center device 74 is comprised of a pair of inter-fitting sleeves 76 and 77 containing a compression spring 78 urging the sleeves 76 and 77 apart. The over-center device 74 tends to urge the control extension or channel 72 into respective opposite positions determined by the limits of lateral pivotal movement permitted the switch tongue 40. Any suitable actuating device such as a pneumatic extensible member 79 is provided to urge the switch tongue 40 into one of the desired positions from a remote station.

Assuming that the load carrying trolley 2 is traveling along the rails 5 and 6 toward the branch rails 17 and 18 and it is desired to switch the trolley from the rails 5 and 6 to the branch rails 17 and 18, the operational sequence is as follows: before the wheels 3 reach the vicinity of the support leg 43, the pneumatic extensible member 79 is actuated to rotate the channel 72 which, through the support rod 56, rotates the switch tongue 40 so that the rail head contacting portion 54 contacts the lateral inside surface 23 of the rail 5. The guide rollers 22 are gradually rotated about a vertical axis 79' by contacting the outside lateral surface 51 of the switch tongue 40 which turns the load carrying wheels 3 and 4 and guides the trolley 2 toward the rails 17 and 18. The chain dog 10 becomes disengaged from the trolley 2 as it leaves the rails 5 and 6, the trolley 2 continuing either by momentum or by auxiliary drive means (not shown). While the load wheels 3 and 4 are in contact with the upper load bearing surface 52 of the switch tongue 40 the load transmitted to the switch tongue thereby is supported at one end of the switch tongue by the support leg 43 bearing against the load plate or pad 44, and at the other end thereof substantially entirely by the support rod 56 bearing against the bearing 68 supported by the channel 63. After the trolley 2 continues out of the switch structure or zone 16 the switch tongue 40 may be switched back so that the rail head contacting portion 54 contacts the lateral inside surface 24 of the rail 6, known as the straight-through position and which permits the succeeding trolley to be driven through the switch structure or zone 16 and continue on the rails 5 and 6.

It is noted that the support leg 43 is pointed at the swinging or free end 80 thereof which will result in a tendency for the leading guide roller 22 to urge the switch tongue 40 in one or the other of its normal positions in case the over-center device 74 fails in its operation. Without this feature the trolley 2 might jam against the switch tongue 40 placing a severe shock load on the structure.

The above described switching structure has been found to greatly simplify and facilitate the inclusion of branch rails in a power and free conveyor system while

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offering high strength and lack of congestion in the switching area.

It is to be understood that while we have illustrated and described one form of our invention it is not to be limited to the specific form or arrangement of parts herein described and shown except insofar as such limitations are included in the claims.

What we claim and desire to secure by Letters Patent is:

1. In a power and free conveyor system having trolleys with load wheels riding on a pair of spaced load carrying rails of the type having a rail head, a web and a rail flange, and a switch zone through which the trolleys pass for selective switching to another pair of spaced load carrying rails, said trolleys having guide means contacting and extending below lateral inside surfaces of said rail heads, said switch zone being characterized by structure including; a frame for supporting said pairs of rails, an elongated load carrying switch tongue located at the junction of said pairs of rails, said switch tongue having an enlarged end portion and an inwardly tapering body portion extending away from said end portion, said body portion terminating in a support leg adapted to be received beneath said rail heads, support pads secured adjacent cut-out portions of said rail flanges for supporting said support leg with respect to said rails, said body portion being shaped to present outside lateral surfaces blending into lateral inside surfaces of said rail heads for contacting said guiding means, said body portion having an upper load bearing surface aligning with the load bearing surfaces of said rail heads and terminating in a rail head contacting portion providing substantial continuity of support surface for said load wheels, said switch tongue being rotatable into switching positions about an axis extending through said enlarged end portion.

2. The apparatus of claim 1 including a support member fixed to said switch tongue and extending normally therefrom, said support member extending adjacent a portion of said frame, and a thrust bearing operatively connected to said frame and said support member.

3. In a power and free conveyor system having trolleys with load wheels riding on a pair of spaced load carrying rails of the type having a rail head, a web and a rail flange, and a switch zone through which the trolleys pass for selective switching to another pair of spaced load carrying rails, and a chain track beam spaced upwardly from said first-named pair of rails, said trolleys being guided by depending guide rollers thereon contacting and extending below lateral inside surfaces of said rail heads, said switch zone being characterized by structure including; a frame for supporting said pairs of rails and chain track beam, an elongated load carrying switch tongue located at the junction of said pairs of rails, said switch tongue having a semi-circular end portion and an inwardly tapering body portion extending away from said end portion, said body portion terminating in a support leg adapted to be received beneath said rail heads, support pads secured adjacent cut-out portions of said rail flanges for supporting said support leg with respect to said rails, a cut-away web portion in at least one of said load carrying rails for receiving said support, said body portion being shaped to present outside lateral surfaces blending into lateral inside surfaces of said rail heads

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for contacting said guide rollers, said body portion having an upper load bearing surface aligning with the load bearing surfaces of said rail heads and terminating in a rail head contacting portion providing substantial continuity of support surface for said load wheels, said switch tongue being rotatable about a vertically extending axis extending through said semi-circular end portion, said rotation being limited between two tongue positions determined by the contact of said rail head contacting portion with opposite rails, a support member fixed to said switch tongue and extending vertically therefrom coincident with said axis, said vertically extending support member extending past said chain track beam and through a portion of said frame, a thrust bearing operatively connected between said vertically extending support member and said frame for pivotally supporting said semi-circular end portion by said frame, said vertically extending support member being provided with a control extension extending laterally therefrom, and a resiliently biased over-center device operatively connected to said control extension whereby said switch tongue is selectively urged in one of said positions.

4. The apparatus of claim 3 wherein a remote control means is adapted to engage said control extension for selectively urging said switch tongue into said positions.

5. In a power and free conveyor system having trolleys with load wheels riding on a pair of spaced load-carrying rails of the type having a rail head, a web and a rail flange, and a switch zone through which the trolleys pass for selective switching to another pair of spaced load-carrying rails, said trolleys having guiding means contacting and extending below lateral inside surfaces of said rail heads, said switch zone being characterized by structure including; a frame for supporting said pairs of rails, an elongated load-carrying switch tongue located at the junction of said pairs of rails, said switch tongue having an enlarged end portion and an inwardly tapering body portion extending away from said end portion, said body portion terminating in a support leg adapted to be received beneath said rail heads, at least one of said load-carrying rails having a cut-away web portion therein for receiving said support leg, support pads secured adjacent cut-out portions of said rail flanges for supporting said support leg with respect to said rails, said body portion being shaped to present outside lateral surfaces blending into lateral inside surfaces of said rail heads for contacting said guiding means, said body portion having an upper load-bearing surface aligning with the load-bearing surfaces of said rail heads and terminating in a rail head contacting portion providing substantial continuity of support surface for said load wheels, said switch tongue being rotatable into switching positions about an axis extending through said enlarged end portion.

6. The apparatus of claim 1 wherein said support leg terminates in a free end, said free end being in the shape of a point adapted to engage said trolleys for urging said switch tongue into a switching position.

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