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Swilley

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[54] **SWITCH MECHANISM FOR OVERHEAD TROLLEY**

[75] Inventor: **Wilson H. Swilley,** Richmond, Calif.

[73] Assignee: **The Cincinnati Butchers Supply Company,** Cincinnati, Ohio

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[52] **U.S. Cl.** **104/100,** 104/103

[51] **Int. Cl.** **E01b 25/26**

[58] **Field of Search** 104/101, 96, 100, 103, 104/130–132

[56] **References Cited**

UNITED STATES PATENTS

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421,225	12/1934	Great Britain	104/100

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—Andres Kashnikow
Attorney, Agent, or Firm—J. Warren Kinney, Jr.

[57] **ABSTRACT**

A switch mechanism for use with an overhead track network is adapted to be inserted between spaced apart end sections of a plurality of track elements for selectively directing a trolley riding thereon from one to another of the elements wherein each of the track and switch elements are of like circular cross-section, having internal fixed and/or hinged couplings therebetween to minimize the interference encountered by the trolley as it passes from element to element.

18 Claims, 7 Drawing Figures

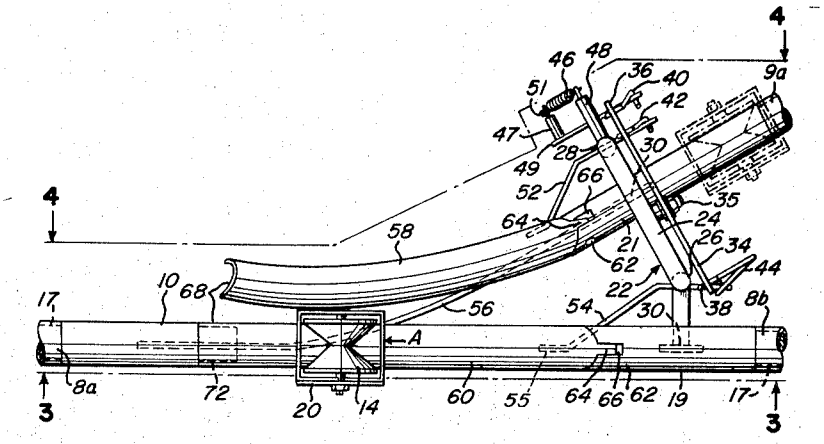


FIG-1

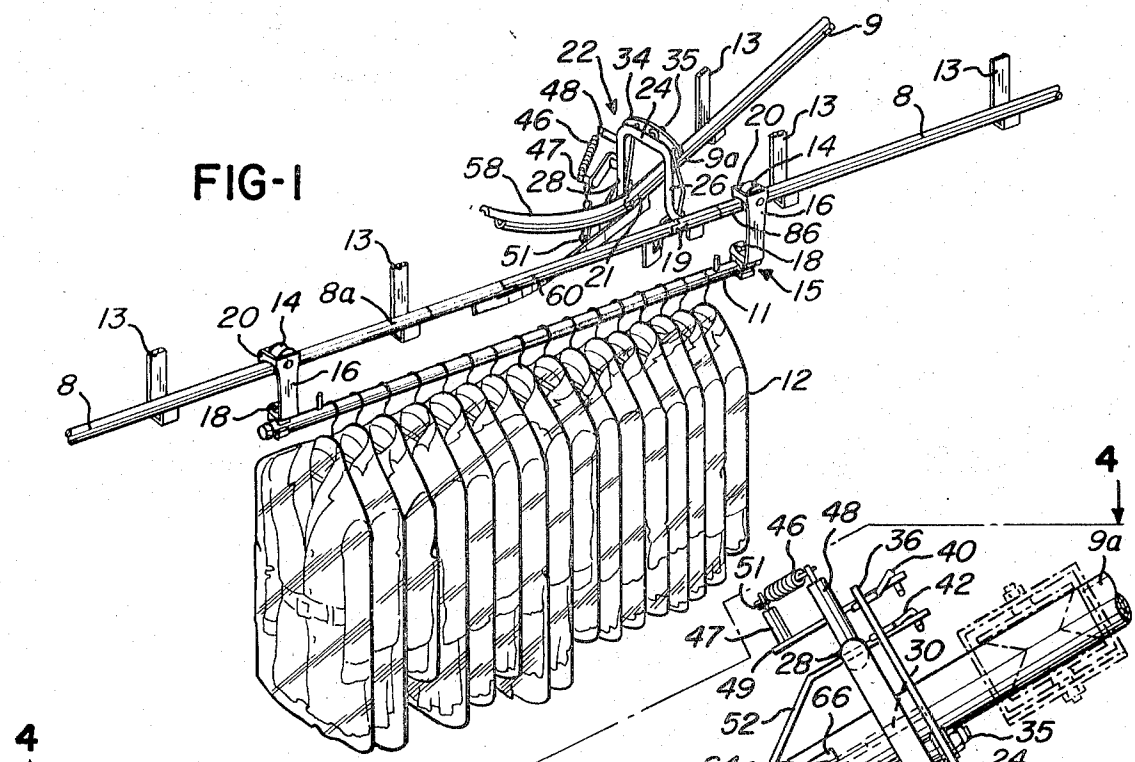


FIG-2

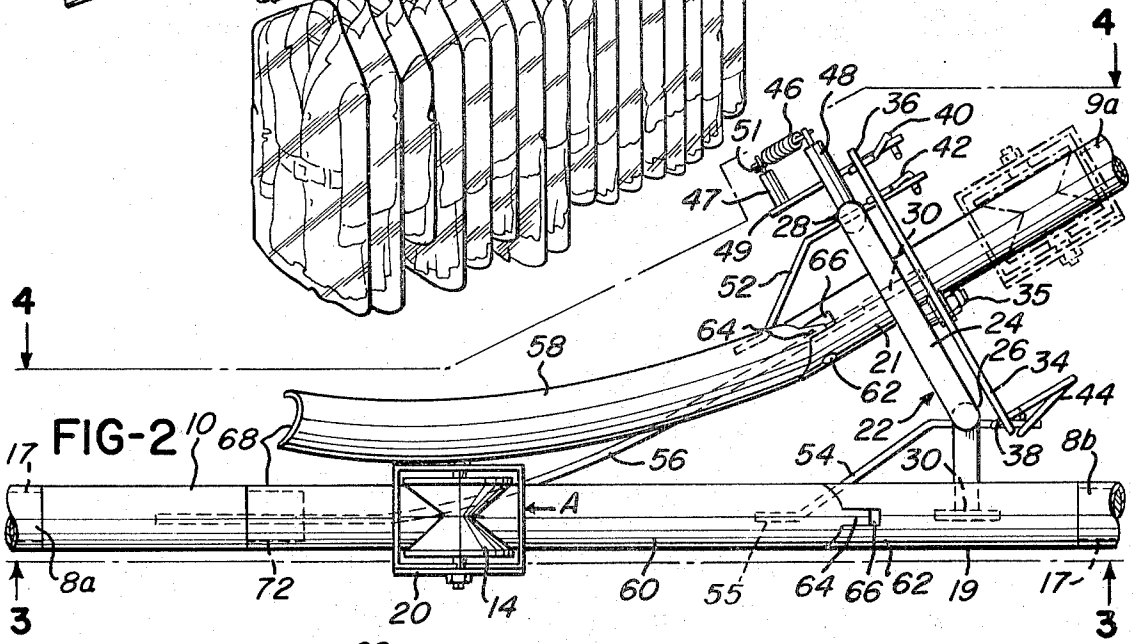
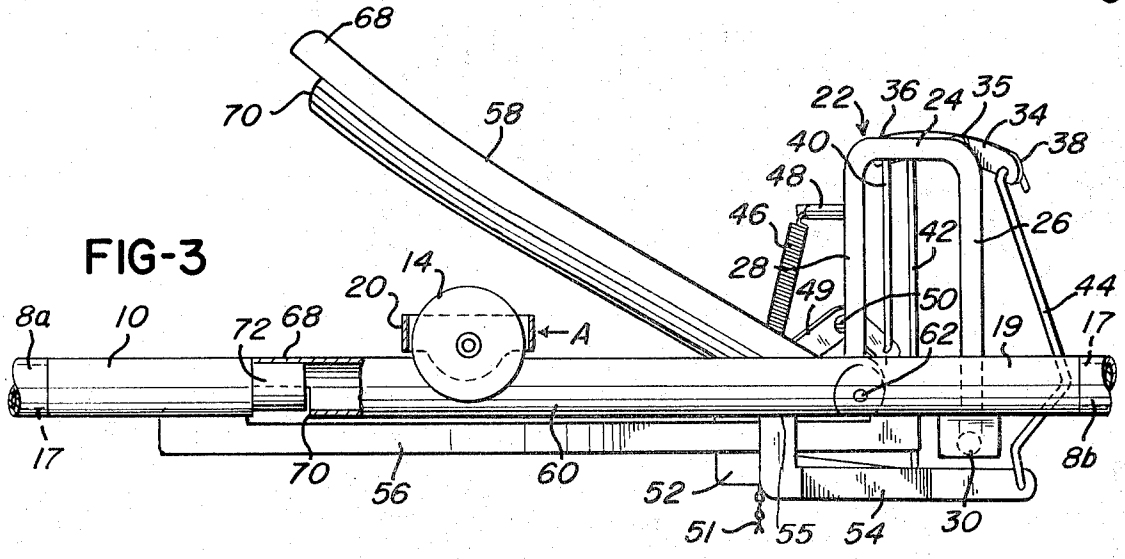


FIG-3



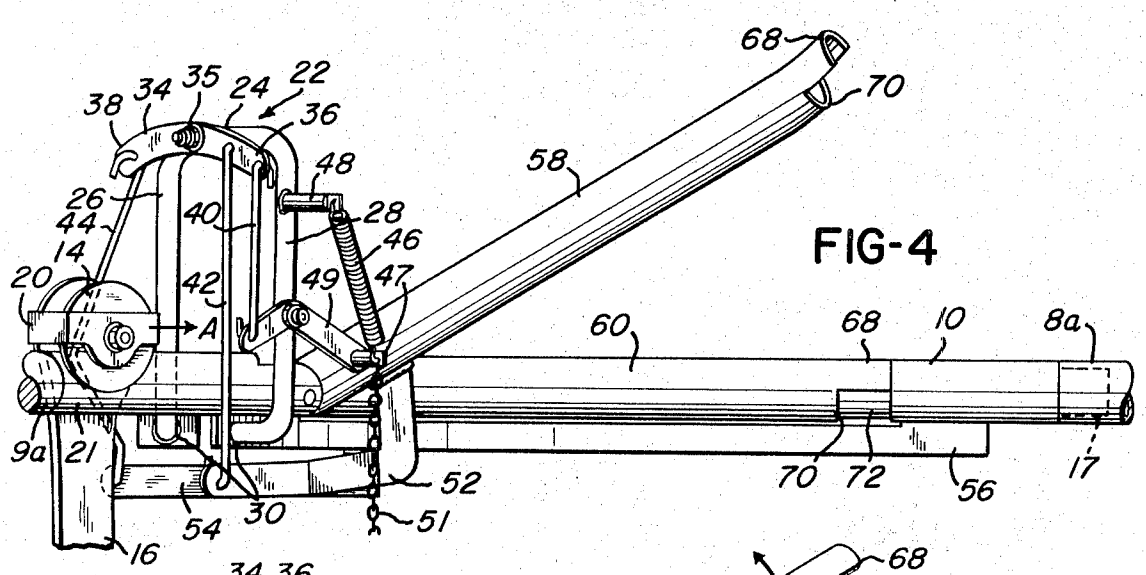


FIG-4

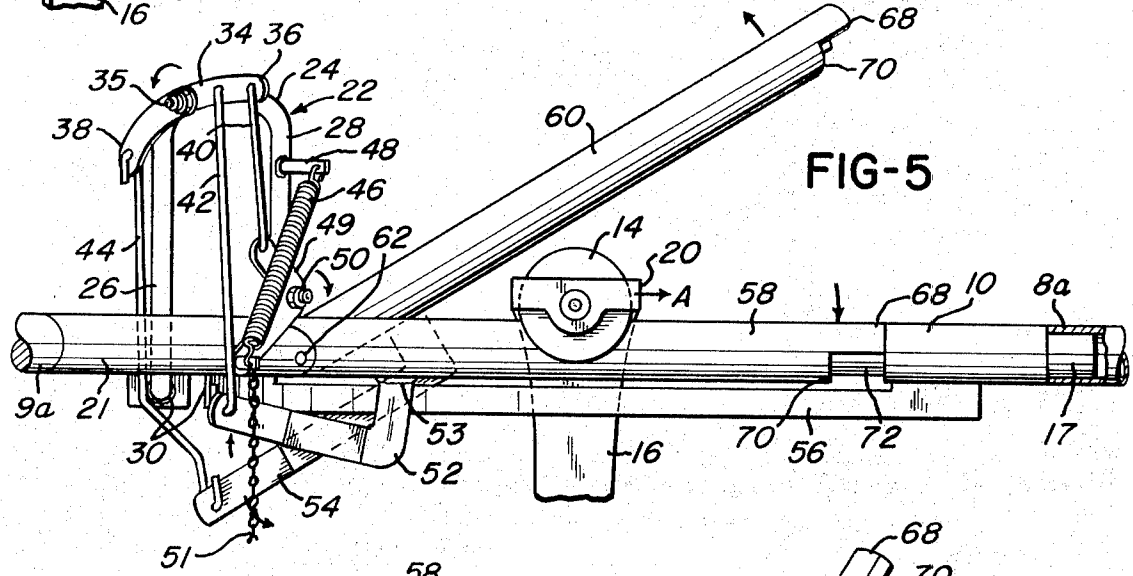


FIG-5

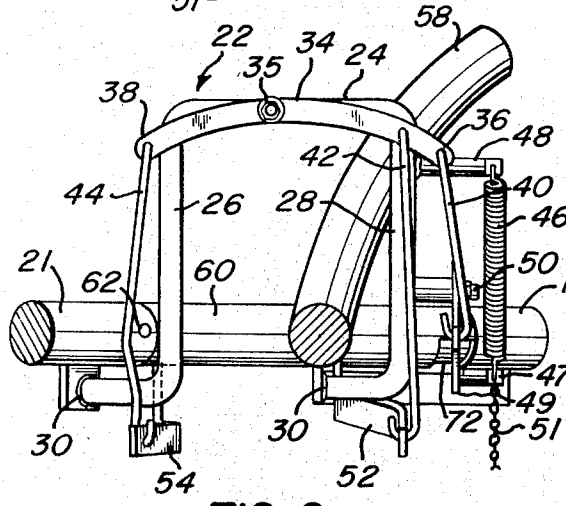


FIG-6

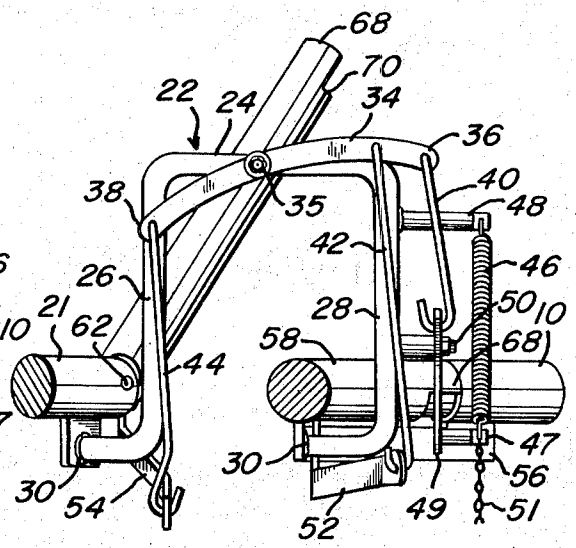


FIG-7

SWITCH MECHANISM FOR OVERHEAD TROLLEY

BACKGROUND OF THE INVENTION

It is common practice to employ overhead conveyors in various types of warehouses, for example garment storage warehouses where as many as fifty garments may be stored on single rods or hangars, and other establishments wherein objects are likewise suspended and conveniently transferred by means of wheeled trolleys. The conveyors may consist of horizontal and sometimes inclined tracks over which the trolleys are movable to carry suspended objects along a track network which may include a number of spur tracks for delivering the objects to various stations or locations off the main line of track. Where spur tracks are employed, it is necessary to install switching mechanisms in the main line of the track for directing the trolleys and their loads to the various stations or locations.

Most overhead track systems include track elements of narrow, rectangular cross-section which require precise alignment of the tracks to ensure proper and free suspension of the trolley mechanism. Further, tracks of rectangular cross-section, particularly where each track element was of a solid cross-section, required external coupling devices and external pivot hinges to secure various track and switch elements together. This increased the probability of interference between the track and trolley mechanism as the trolley advanced along the track network. Further, each track element had to be singularly welded or otherwise secured to the next element in line, making alteration of an installed track network difficult and expensive.

The switches of the prior art were difficult to install, requiring precise alignment with respect to track sections and often requiring weldments to ensure proper coupling. Each switch had external seating members and external pivot hinges for controlling the various switch elements. These external devices often created unnecessary interference with trolley mechanisms. Further, each switch included one continuous track member, integral with the main track, making the mechanism heavy and unwieldy during installation, and requiring external seats or guides for aligning the switch elements therewith.

Examples of various switching devices are found, for example, in U.S. Pats. Nos. 3,503,336; 3,063,384; 2,944,491; and 2,746,397. In each of these patents the switch mechanism includes at least one continuous track section having a recess for accepting elongate switch elements. Further, each switch element of the cited patents had to be welded or similarly secured to existing track elements in order to operate properly. Also due to the rectangular cross-section of the track, precise alignment of the track elements and the switch elements was required to ensure proper suspension of the trolleys from the track network.

None of the prior art patents disclose a switch mechanism that is lightweight, durable, easy to install and designed to be interposed between spaced apart end sections of track elements rather than integral with at least one continuous track member. Further, none of the switch mechanisms permitted installation without critically limiting the angular displacement or alignment of the switch and track elements. Each of the prior art patents also included external pivots and couplings to secure the switch elements to the various track components, creating added interference wit the trolley mechanism.

It is, therefore, an object of the present invention to provide a switch mechanism for use with overhead track networks that is lightweight, durable, easy to install, and adapted to be interposed between various spaced apart end sections of track elements.

It is further, an object of the invention to provide a switch mechanism having internal coupling elements, thus minimizing the interference encountered by a trolley passing there across.

Another object of the invention is to provide a track and switch network permitting installation and operation without requiring critical alignment between track and switch elements.

Other features and objects of the invention will be readily apparent from the accompanying drawings and description.

SUMMARY OF THE INVENTION

The present invention relates generally to switch mechanisms for overhead track systems, particularly track systems utilizing track elements of circular cross-section.

The present invention provides a switch mechanism that may be interposed between spaced apart end sections of overhead main track elements having circular cross-section. The track network is adapted for carrying a suspended trolley from one point to another, the switch mechanism necessary to direct a trolley along the overhead main track or an adjacent overhead spur track having like cross-section and having an end element disposed near the main track. The switch mechanism comprises a first elongate switch element and a second elongate switch element each being selectively engageable with a primary end of the main track and each coupled to independent secondary track elements, the elongate switch elements being pivotally connected to a singular track and selectively joined with the primary track element to direct the trolley thereacross.

All of the components of the track network and the switch mechanism are of circular cross section, permitting internal hinging and coupling elements to be utilized between the elongate switch elements and the end sections of the various track elements, thus reducing the interference encountered by a trolley passing thereacross. Utilization of switch and track elements of circular cross section further permits operation without requiring specific angular displacement of components, making installation more efficient and economical.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an overhead track network incorporating the switch of the present invention.

FIG. 2 is a top view of the switch mechanism.

FIG. 3 is a side view of the switch mechanism, taken along line 3—3 of FIG. 2.

FIG. 4 is a side view of the switch mechanism, taken along line 4—4 of FIG. 2.

FIG. 5 is a view similar to FIG. 4, illustrating the switch in the counter position.

FIG. 6 is an end view of the switch mechanism as shown in FIG. 4.

FIG. 7 is an end view of the switch mechanism as in FIG. 5.

DETAILED DESCRIPTION OF THE DRAWINGS

As illustrated in FIG. 1, the overhead track network embodying the present invention is of circular cross section, having an overhead main track designated generally as 8, and at least one adjacent overhead spur track 9, each track being supported by a number of suitable suspending hangar supports 13. The switch mechanism of the present invention is interposed between the ends 8*a* and 8*b* of the main track and adjacent the end 9*a* of the spur track for selectively directing trolley 15 along main track 8 or spur track 9.

The trolley may carry any variety of objects, for example, garments 12, suspended from rod 11. Flanged wheels 14, rotatably carried in frames 20 and secured to depending support arms 16 are pivotally attached to rod 11 at 18 to permit cornering of the trolley as it passes along the track network. As best illustrated in FIG. 2, wheels 14 are "V" flanged to seat properly on the circular track elements without regard to the angular displacement thereof, and to ensure proper suspension of trolley 15 without interference in travel.

The switch mechanism for transferring trolley 15 from the main track to the spur track, or vice versa, is best illustrated in FIGS. 2–7. When a switch element is said to be open, trolley 15 cannot pass onto the track controlled by the switch element; and conversely, when a switch element is said to be closed, the trolley may pass uninterruptedly onto the track so controlled. The switch mechanism is adapted to be interposed between spaced apart ends 8*a* and 8*b* of the main track, and end 8*a* of the main track and end 9*a* of the spur track. Since the switch mechanism always couples end 8*a* with either end 9*a* or end 8*b*, end 8*a* is designated as the primary track end and ends 9*a* and 8*b* are designated as secondary ends.

By utilizing tubular track elements having substantially uniform inner and outer diameters, a primary coupling insert 10 may be simply introduced into primary end 8*a* by providing a reduced end portion 17 having an outer diameter substantially conforming to the inner diameter of the track element. The central portion of the coupling has a diameter substantially conforming to the outer diameter of the track element, thus providing a smooth, continuous surface for the wheels 14. Likewise, pivot coupling inserts 19 and 21 are inserted into respective secondary end 8*b* and 9*a*. Elongate switch elements 58 and 60 are each pivotally secured to their respective pivot coupling inserts 19 and 21 and are adapted to be selectively engaged with the primary coupling insert 10, to alternately close the switch between ends 8*a* and 8*b* or ends 8*a* and 9*a*.

A countermotion for switch elements 58 and 60, requiring that at all times one element is closed and one element is open, is provided by the mechanism carried by the rigid yoke designated generally by the numeral 22. Depending legs 26 and 28 of the yoke are fixedly secured to their respective pivot couplings 19 and 21 at 30. By securing the yoke mechanism in this manner, rather than to track elements 8 and 9, no alteration of the track elements is required when it is desired to install a switch mechanism in an existing track network. Thus, switches may be added to or deleted from a track system efficiently and economically, permitting alteration of the network at minimal cost by inserting or withdrawing couplings 10 and 19, and 21 attached to the appropriate switch.

Spring tensioner arm 49, pivotally attached to depending leg 28 at 50, controls the position of switch elements 58 and 60 by positioning operating pitman 40 of bell crank 34 pivotally attached at 35 to header 24 of the yoke 22. A first upright link 42 of the bellcrank is located on one side 36 of pivot 35 and is pivotally attached to control arm 52 which is rigidly secured to element 58 at 53. To provide element 60 with a countermotion, a second upright link 44 is located on the other side 38 of pivot 35 and is pivotally secured to control arm 54 which is attached to element 60 at 55. Thus, when spring tensioner arm 49 is in the position shown in FIG. 4, element 60 of the switch is closed, coupling primary end 8*a* with secondary end 8*b*. The counterposition is shown in FIG. 5, wherein the spring tensioner arm is rotated past pivot 50, closing element 58 and opening element 60, thus coupling primary end 8*a* with secondary end 9*a*.

To ensure proper closing of elements 58 or 60 when the spring tensioner arm is rotated, a spring 46 is secured at one end to stud 47 of the arm and at the other end to stud 48 extending from and fixedly secured to depending leg 28. The spring tension will draw arm 49 toward stud 48 whenever the arm is rotated in either direction past pivot 50 thus properly seating each element 58 or 60 on end portion 72 of primary coupling 10.

Switch elements 58 and 60 may be activated either by pulling tether line 51, thus rotating arm 49 past center 50, or by motion of trolley 15. As wheel 14 approaches the switch mechanism along track 9, see arrow A, FIGS. 4 and 5, it will progress along the track forcing element 58 to close and alternatively, element 60 to open. As this happens, bellcrank 34 rocks on pivot 35, arm 48 rotates past the center 50, spring 46 pulling the arm and the switch element into place. The elements will then be locked in this position until another trolley approaches along track 8, or the switch is reversed by pulling tether line 51.

By utilizing track and switch elements of circular cross section it is possible to provide internal pivots in and element seats or guides for the switch mechanism, thus reducing the interference of trolley advancement normally encountered at switch mechanisms. Primary coupling 10 includes two reduced end portions 17 and 72, conforming substantially to the inner diameter of the track elements. End 17 of the coupling is simply inserted in primary end 8a and embraced by the interior wall of the track element 8. The coupling may be secured to the track by epoxy or other suitable adhesive substances if desired. End portion 72 provides a suitable seat for the switch elements, each element having an arcuate surface 68 extending beyond end 70 for that purpose. Each arcuate extension has an outer peripheral surface conforming to the outer diameter of the track elements and the coupling 10, and an internal surface conforming to the outer diameter of the reduced end portion 72. The arcuate surface spans less than 180°, allowing each element 58 and 60 to be simply lifted or pivoted away from and/or toward coupling 10, opening and/or closing the switch. By providing the track elements, coupling 10, arcuate extension 68, and each switch element 58 and 60 with an outer peripheral surface generated by a constant radius, a smooth continuous track is provided, even over the switch cou-

plings. Further, angular displacement of the various components is not critical since the wheel **14** will be seated on any portion of the peripheral surface without creating interference.

The pivot end of each switch element is likewise adapted to the circular track to provide minimum interference. Pivot or secondary coupling **19** and **21**, as primary coupling **10**, include a reduced end portion **17** adapted to be inserted in the end of the track elements. The remaining body of the pivot coupling conforms to the outer diameter of the track elements to provide a smooth continuous track surface.

The opposite end of each pivot coupling is bifurcated to provide socket **66** adapted to receive ear **64** of each switch element. A pivot pin **62** is then placed through a diameter of the coupling body and perpendicular to the walls of the bifurcated end portion to provide an internal pivot for each switch element **58** and **60**. Thus, it can be seen that the switch elements **58** and **60** are pivoted on pin **62** whenever spring tensioner arm **49** is activated thereby, selectively seating extension **68** of either element **58** or element **60** on end portion **72** of coupling **10**, while simultaneously withdrawing the other switch element.

To improve the rigidity of the switch mechanism, support arm **56** may be secured to the primary end of the switch at coupling **10** and one of the secondary ends of the switch at one of the secondary pivot couplings here shown at coupling **21**. For light weight applications the arm is not necessary, however, it may be desirable to improve the rigidity and durability of the track system.

While most switch mechanisms elevate the open element, by utilizing the mechanism here shown, the elements may be opened and closed from a variety of positions without increasing the interference encountered by wheel **14** progressing from track elements to switch elements. Further, while the particular embodiments here shown include a pair of switch elements, it should be understood that the teachings of the invention may be utilized with any number of elements.

What is claimed is:

1. A switch mechanism for selectively coupling the laterally spaced ends of a main track of circular cross-section with each other or for coupling one of said laterally spaced main track ends with the spaced end of a secondary track of circular cross-section, said switch mechanism comprising: a first elongate switch element and a second elongate switch element each of circular cross-section; a first coupling unit, a second coupling unit and a primary coupling unit, each of circular cross-section; means pivotally interconnecting one end of each of said elongate switch elements to one end of said first and second coupling units, respectively; means immovably securing each of said three coupling units in spaced, fixed relationship, wherein one end of said primary coupling unit is adapted to be alternatively engaged by the free end of said first and second switch elements; each of said three coupling units terminating in a free, outer, track-end engaging portion; and means operable for elevating the free outer end of a switch element from engagement with an end of said primary coupling unit as the free outer end of the other switch element is advanced toward seating engagement with the said end of said primary coupling unit.

2. A switch mechanism as called for in claim **1**, wherein the free, outer, track engaging portion of each of the coupling units are adapted to effect a slip fit connection with the respective ends of the main and secondary tracks.

3. A switch mechanism as called for in claim **1**, wherein the adjacent ends of the switch elements and the primary coupling unit are adapted to provide an uninterrupted upper semi-circular track surface when the free end of either of the switch elements engage said coupling unit.

4. A switch mechanism as called for in claim **1**, wherein the pivotally interconnected ends of each of switch element provides an interrupted upper semi-circular track surface with their respective coupling units when the opposite end of a switch element engages the primary coupling unit.

5. A switch mechanism for selectively coupling the laterally spaced ends of a main track of circular cross-section with each other or for connecting one of said ends with the end of a secondary track of circular cross-section wherein the switch mechanism comprises a first elongate switch element having one end pivotally mounted relative to the end of one secondary track element for alternative disposition to an operative position of engagement with and an inoperative position of disengagement from the end of the primary track element, a second elongate switch element having an end pivotally mounted relative to the end of the other secondary track element for alternative disposition to an operative position of engagement with and an inoperative position of disengagement from said end of the primary track element.

6. A switch mechanism as called for in claim **5**, wherein each of said track elements are elongate tubular members having substantially uniform inner and outer diameters.

7. A switch mechanism as called for in claim **6**, including a coupling member adapted to be inserted in and to extend outward from the end of primary track element.

8. A switch mechanism as called for in claim **7**, wherein said coupling member is of circular cross-section having a diameter substantially conforming to the inner diameter of said track elements.

9. A switch mechanism as called for in claim **7**, wherein each of said switch elements includes a second end, said second end adapted to be selectively engaged and disengaged with said coupling member.

10. A switch mechanism as called for in claim **9**, wherein said second end includes an arcuate extension having a peripheral surface conforming substantially to the outer diameter of said track elements and spanning less than 180°, said extension adapted for selective engagement and disengagement with said coupling member.

11. A switch mechanism as called for in claim **5**, wherein the first end of each of said elongate switch elements is pivotally secured to a pivot coupling, said pivot coupling adapted to be fixedly secured to the end of a secondary track element.

12. A switch mechanism as called for in claim **11**, wherein said pivot coupling includes a first end portion adapted to be inserted in the end of a secondary element.

13. A switch mechanism as called for in claim **12**, wherein said first end portion is of circular cross-section having a diameter substantially conforming to the inner diameter of said track elements.

14. A switch mechanism as called for in claim 11, wherein said pivot coupling includes a second, bifurcated end portion containing an internal pin for pivotally carrying the first end of each switch element.

15. A switch mechanism as called for in claim 14, wherein said second end portion is of circular cross-section, having a diameter substantially conforming to the outer diameter of said track elements.

16. A switch mechanism as called for in claim 14, wherein said switch elements are of circular cross-section, the first end of each switch element including an elongate projection substantially spanning the diameter of said switch element and adapted to be pivotally carried by said internal pin.

17. A switch mechanism as called for in claim 16, wherein each of said switch elements has a diameter substantially conforming to the outer diameter of said track elements.

18. A switch mechanism as called for in claim 6, wherein each of said switch elements is of circular cross-section, having a diameter substantially conforming to the outer diameter of said track elements.

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