

[54] **DOUBLE TIERED CONVEYOR TRACK AND SAFETY SWITCH**[76] Inventor: **Robert Auldom Bradley**, 18 Ralston Ave., Toronto, Ontario, Canada, M4C 3L5[22] Filed: **Nov. 15, 1974**[21] Appl. No.: **523,986**[30] **Foreign Application Priority Data**

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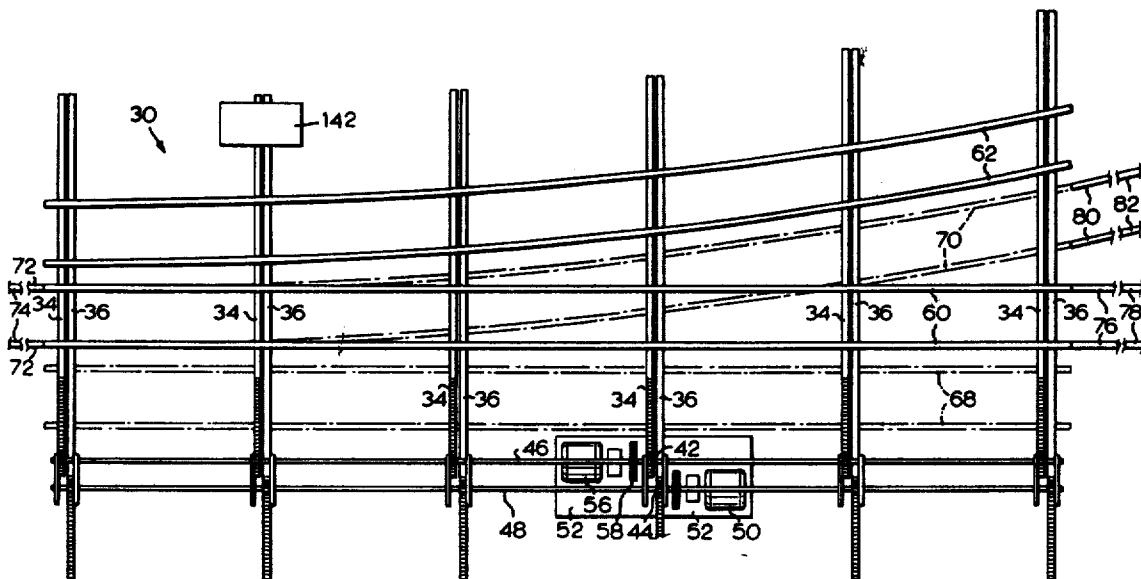
[58] Field of Search 104/94, 95, 124, 125, 102, 104/103, 88, 130, 132, 96, 105, 89, 91; 246/430, 448, 401, 392, 380, 358

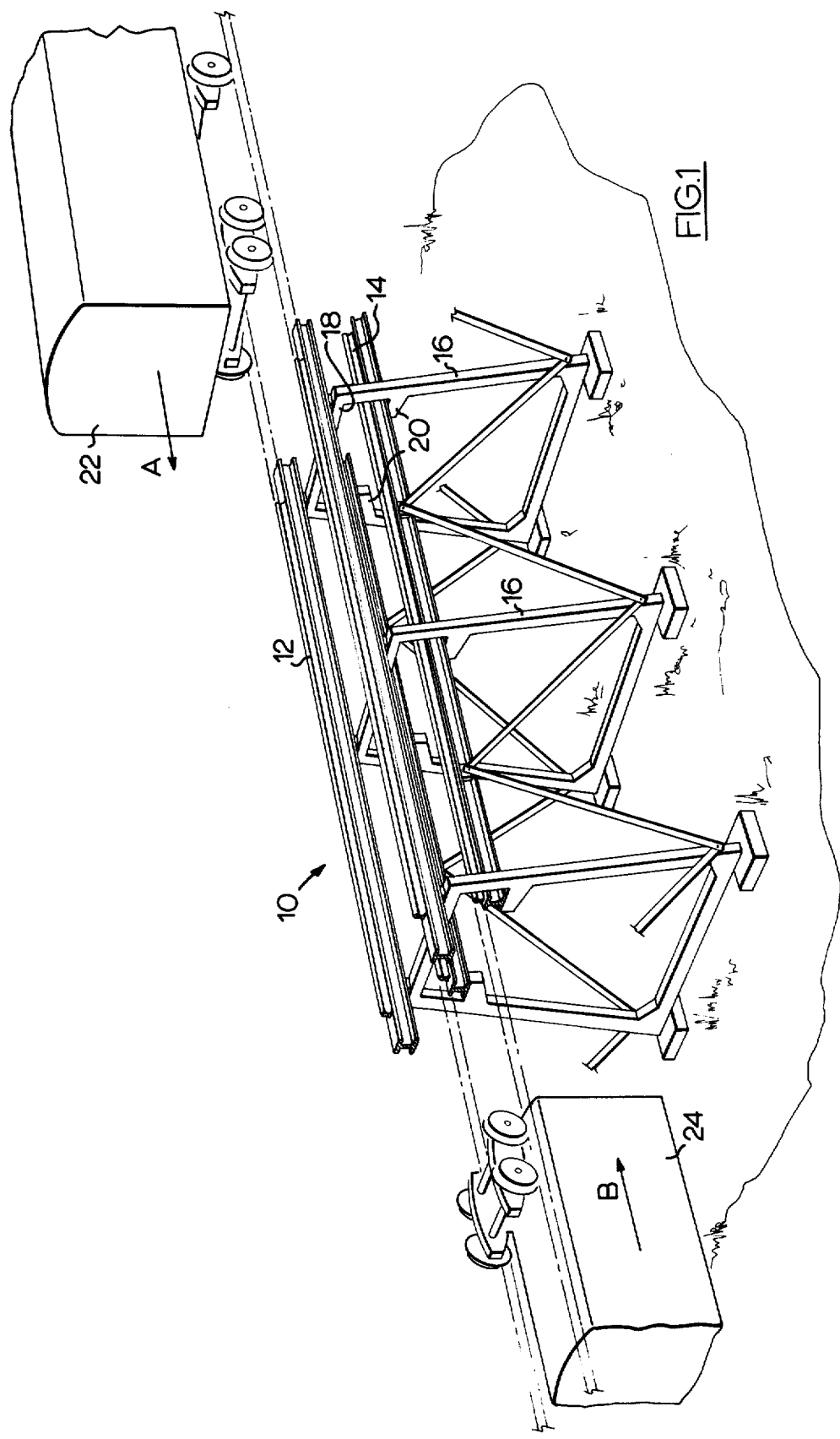
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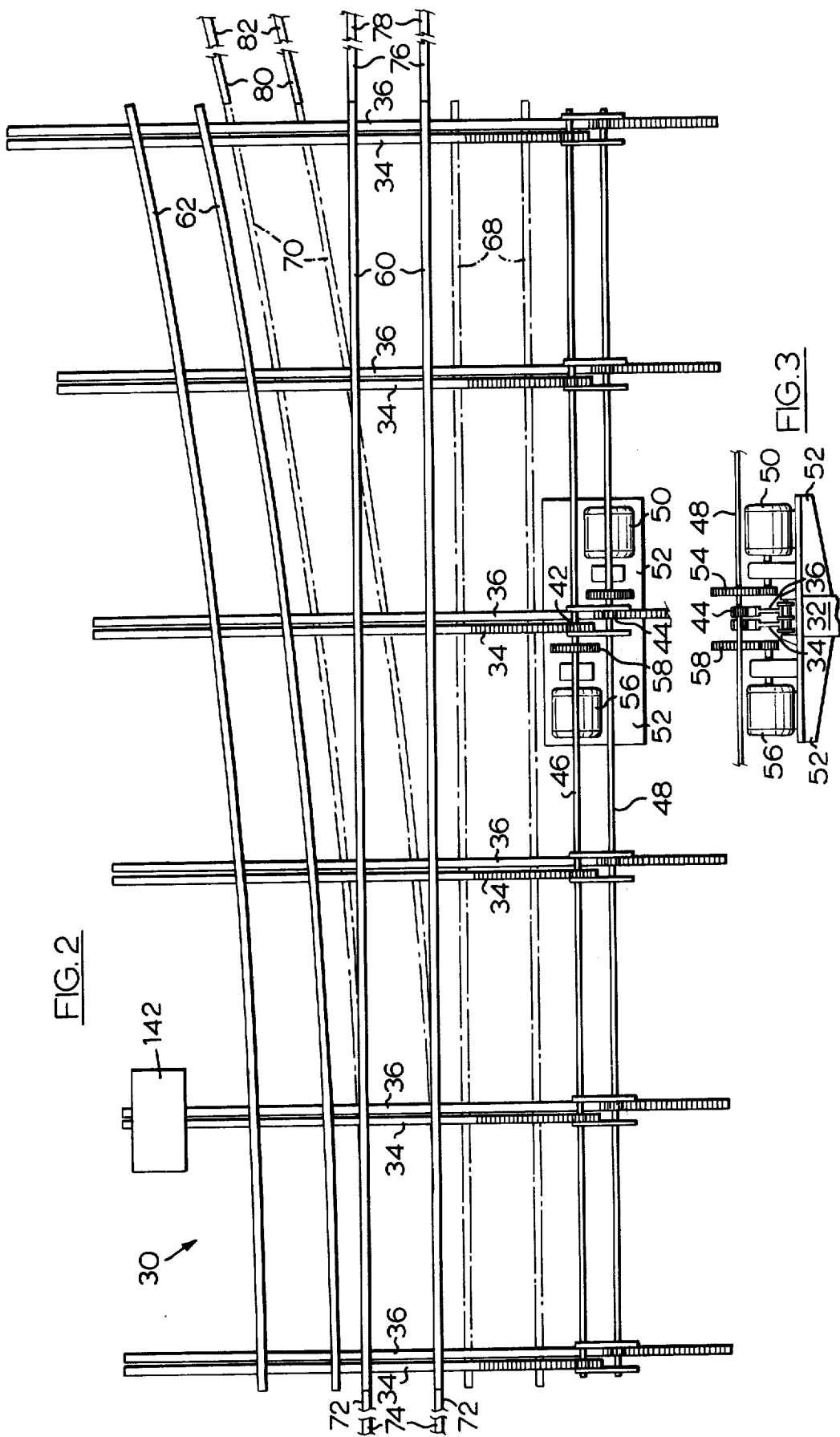
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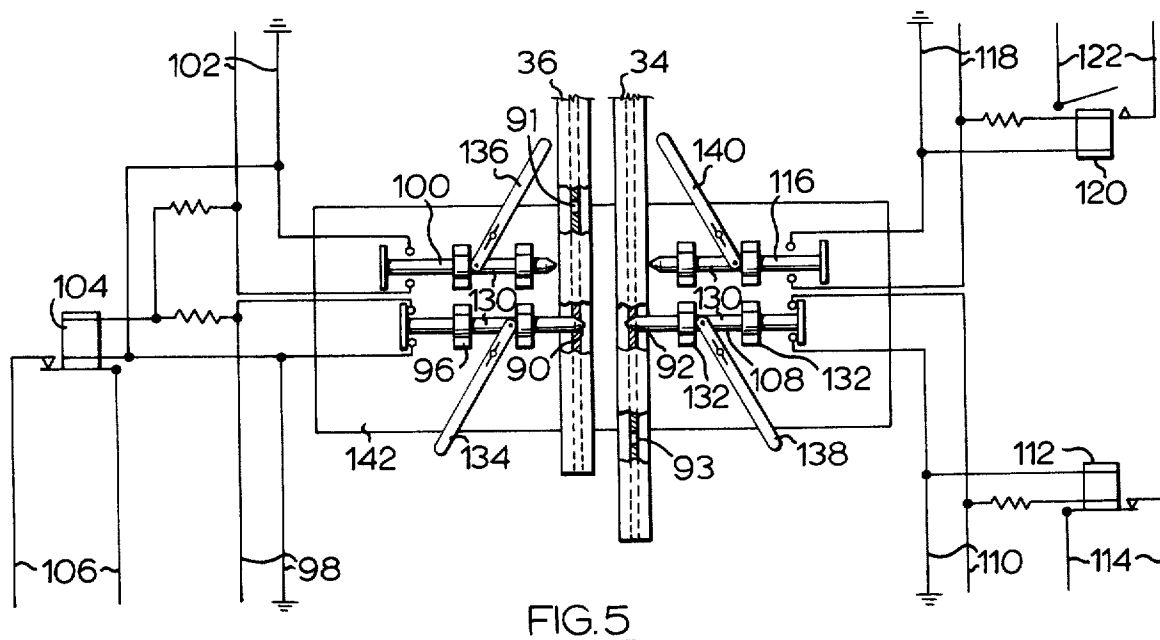
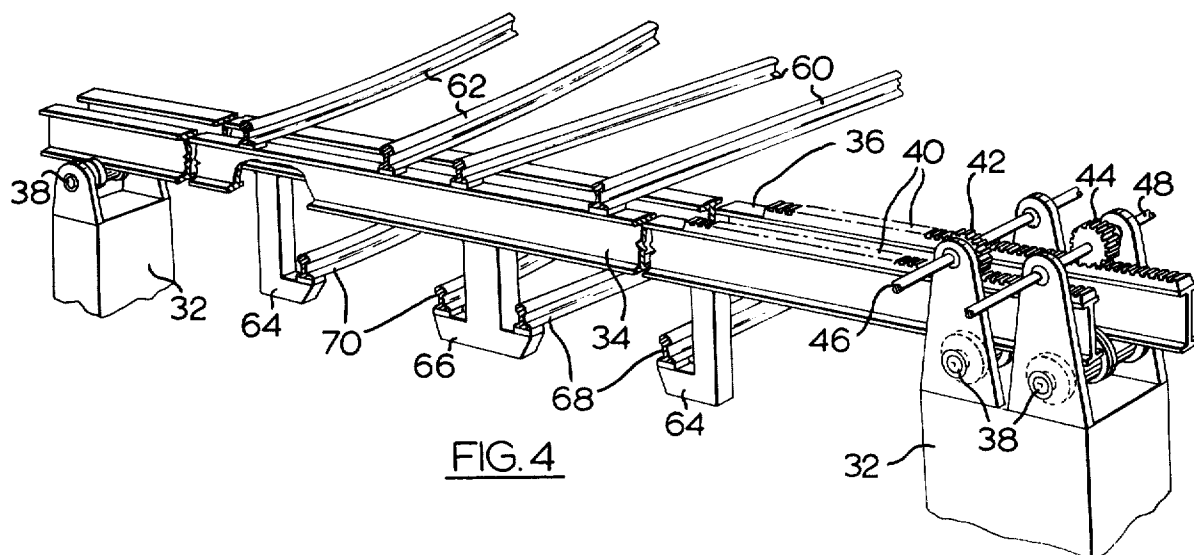
ABSTRACT

Railway systems for providing two-way traffic generally employing a track bed of sufficient width to accommodate two side-by-side tracks. Alternatively, when the track going vehicles are manned, suitable sidings are provided to permit one vehicle to pass another on a single track system. A railway system of the present invention is suitable for use by unmanned rail going vehicles in that it provides two elevated tracks raised one above the other. A switching mechanism is provided for connecting a main line to a branch line with suitable electrical control means for controlling the supply of electrical power to the track in the area of the switching means to prevent a vehicle entering the switch when the switch is open.

7 Claims, 5 Drawing Figures







DOUBLE TIERED CONVEYOR TRACK AND SAFETY SWITCH

FIELD OF INVENTION

This invention relates to an electrified railway system and a switching mechanism for use therein.

PRIOR ART

Numerous proposals have been made for providing unmanned transportation in remote areas such as the Arctic. These proposals have included pipeline systems and railway systems. The fact that the railway systems are more versatile in that they are capable of carrying a great variety of cargoes has been recognized. However, it is essential to provide a railway track which will handle two-way traffic. Following conventional railroad tracklaying systems wherein two tracks are laid side by side would be costly and would require an extensive track bed.

Various track switching mechanisms have been developed. However, the known mechanisms do not include provision for the switching of tracks arranged one above the other in sets.

SUMMARY OF INVENTION

According to an embodiment of the present invention, there is provided an elevated railway system which comprises first and second track means for supporting and guiding rail-going vehicles and track support means for supporting the first and second track means in elevated planes wherein the second track means is located directly below the first track means.

The present invention also provides track switching means for selectively and independently completing the upper main line track or connecting the upper main line track with a branch line and for completing the lower main line track or connecting the lower main line track to a lower track branch line as required in use.

The present invention also provides the further improvement of means for interrupting the supply of electrical power to the electrified track immediately adjacent the switching mechanism when the tracks of the switch are out of alignment with the tracks of the adjacent main line or branch line.

PREFERRED EMBODIMENT

The invention will be more clearly understood after reference to the following detailed specification read in conjunction with the drawings wherein

FIG. 1 is a pictorial view illustrating an elevated railway system according to an embodiment of the present invention;

FIG. 2 is a plan view of the switching mechanism for use in the elevated system of FIG. 1;

FIG. 3 is an end view of the drive mechanism for moving the switching rails;

FIG. 4 is a partially sectioned perspective view of one end of the switching mechanism of FIG. 2; and

FIG. 5 is a diagrammatic illustration of the electrical power supply switching mechanism.

With reference to the drawings, the reference numeral 10 refers generally to an electrified railway system according to an embodiment of the present invention.

The railway system provides an upper electrified track 12 and a lower electrified track 14 supported by a plurality of spaced stanchions 16. Each of the stan-

chions 16 has an upper transverse support member 18 supporting the upper track 12 and a pair of oppositely disposed inwardly directed support ledges 20 supporting the lower track 14. In use, a railroad car 22 may be driven along the upper track in the direction of the arrow A, while a second railroad car 24 is suspended from the lower track 14 and driven in the direction of the arrow B. This system provides for two-way railroad traffic on an elevated track which employs a minimum amount of current support.

This structure is particularly suitable for use in remote areas, such as Arctic lands, where it is important to minimize the amount of direct contact with the ground so as to minimize the effect of the system on the frost. The upper or first track 12 is mounted directly above the second or lower track 14 so that the width of the support stanchions 16 is minimized.

FIGS. 2, 3 and 4 serve to illustrate a track switching mechanism suitable for use in connecting a main line track to a branch line.

The switching mechanism is generally identified by the reference numeral 30. The mechanism consists of a plurality of support posts 32 (FIG. 4) disposed on opposite sides of the switching mechanism and each having a first transverse support beam 34 and a second transverse beam 36 extending therebetween. Support rollers 38 serve to support the beams 34 and 36 for transverse movement with respect to the support posts 32. The transverse beams 34 and 36 each have a rack 40 mounted on the upper surface thereof and extending inwardly from one end thereof. A pinion 42 drivingly engages the rack 40 of the first transverse support beam and the pinion 44 drivingly engages the rack 40 of the second transverse beam. The pinion 42 is driven by a drive shaft 46 and the pinion 44 is driven by a second drive shaft 48. Rotation of the drive shaft 46 will cause the first transverse beam 34 to move with respect to the support post 32 and rotation of the drive shaft 48 will cause the second transverse beam 36 to move with respect to the support post 32. The movement of the transverse beams 34 and 36 is independent. As shown in FIG. 3 of the drawings, a motor 50 is mounted on a bracket 52, which is mounted on one of the support posts 32. The motor 50 drives the drive shaft 48 through a gear train 54. As previously indicated, the drive shaft 48 serves to drive the pinion 44, which drives the second transverse beam 36. Similarly, a motor 56 is mounted on the platform 52 and by means of the drive train 58 serves to drive a second drive shaft 46 which in turn drives the first transverse beam 34.

The switching mechanism includes first main line track means 60 and first branch line track means 62 mounted on and movable with the first transverse support means 34. Support brackets 64 and 66 serve to support the second main line track means 68 and second branch line track means 70. The second main line track means 68 and the second branch line track means 70 are movable transversely of the switching mechanism in response to movement of the second transverse support means 36.

With reference to FIG. 2 of the drawings, it will be seen that the switching mechanism is located between a second upper main line section 72, second lower main line section 74 and first upper main line section 76, first lower main line section 78 and upper branch line 80 and lower branch line 82.

In use, the motor 56 may be driven to move the first transverse support beam 34 to selectively align the switch main line track 60 with the main line sections 72 and 76, as shown in FIG. 2 or to align the branch line switch track 62 with the second main line section 72 and the branch line 80. This ensures that a vehicle moving along the upper track towards the switch on either the main line or the branch line may be received by the switch. Similarly, a vehicle moving along the lower track towards the switch may be selectively directed to the lower main line or lower branch line by an operation of the drive motor 50.

It is important to ensure that the electrical power supply to the portions of the track immediately in advance of the switching mechanism, in the direction of travel of the vehicles, is deactivated when the switch tracks are not properly aligned with the main line or branch line tracks. Clearly if a car was approaching the switching mechanism when the switch tracks were being moved from one position to another, the switching mechanism would derail the car. In order to prevent this situation from occurring, the second section 72 of the upper main line electrified track, the second section 74 of the lower main line electrified track, the first section 76 of the upper main line track, the first section 78 of the lower main line track, the first section 80 of the upper branch line track, and the first section 82 of the lower branch line track are independently connected to the source of electrical power. As shown in FIG. 5 of the drawings, the control of the power supply is regulated by the position of the support rails 34 and 36. The support rail 36 has passageways 90 and 91 opening through the web portion of the beam and the support rail 34 has passageways 92 and 93 that similarly open through the web portion of the beam.

A first switching mechanism 96 is adapted to supply power to the lower branch line section 82, lower main line section 74 and lower switch track 70 by way of 98. A second switching mechanism 100 is adapted to supply power to the lower main line section 74, the lower switch main line section 68 and the lower main line section 78 by way of leads 102. By way of a normally open relay 104 and leads 106 the switching mechanisms 96 and 100 serve to supply power to the next preceding controlled section (not shown) of the lower main line track which precedes section 74.

A third switching mechanism 108 is connected by way of leads 110 to the upper main line track sections 72, 76 and the upper main line track switch section 60. The switching mechanism 108 also serves to supply power by way of a normally open relay 112 and leads 114 to the next preceding controlled section of the track extending from the upper main line track section 76. A fourth control switching mechanism 116 serves to control the supply of electrical power by way of leads 118 to the upper branch switch track means 62 and upper branch line section 80 and first main line section 72. By way of normally open relay 120 and leads 122 the fourth control mechanism 116 serves to supply power to the next preceding controlled section to the upper branch line section 80.

Each of the control switching mechanisms consists of the locking pin 130, which is slidably mounted in bearings 132. Control lever arms 134, 136, 138 and 140 are pivotally mounted on a suitable support base 142 for movement between inwardly and outwardly directed positions.

When the switches 96, 100, 108, 116 are in the positions shown in FIG. 5 of the drawings, the track switch is in the position shown in FIG. 2 of the drawings wherein the upper main line track is operational and the lower branch line track is operational. In this configuration the switch 108 is closed to supply power to main line track sections 72, 76 and switch track section 60. The relay 112 is closed to supply power to the track section preceding the main line track section 76. When it is necessary to activate the upper branch line, the lever arm 138 of the switch 108 is moved to remove the locking pin 130 from the passageway 92 of the transverse beam 34. Power is then supplied to the motor 56 of the switch driving mechanism so that the transverse support beams 34 are moved to a position wherein the branch track section 62 of the switching mechanism is aligned with the branch line 80 and the upper main line first section 72. The power to activate the upper branch line is not available until the switch mechanism 116 is closed by moving the lever arm 140 so that the pin 130 of the switch 116 is located in recess 93 of the transverse beam 34. This ensures that during movement of the switching mechanism any car approaching the switch will be deactivated and will come to a stop before it reaches the track switch. When the switch 116 is operational, power is then supplied to the upper branch line 80, the switch branch track 62 and the first main line section 72. The relay 120 also supplies power to the upper track section preceding the branch line section 80. The recess 90 is preferably located at a different height to the recess 91 with respect to the beam 36 so that the locking pin 130 of switch 96 cannot be located in the recess 91. Similarly the locking pin of switch 116 cannot be located in recess 93. This prevents a situation whereby power may be supplied to the track when the switching mechanism is not correctly aligned.

The operation of the lower main line and branch line switching mechanism and the supply of power to the lower tracks is controlled by the position of the transverse support beam 36 and the electrical switches 134, 136 in the manner similar to that described above with respect to the upper track.

From the foregoing it will be apparent that the present invention provides an electrified railway system and a switching mechanism therefor which is particularly well adapted for use in remote areas such as Arctic tundra.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An elevated railway system comprising
 - a. main line track means,
 - b. branch line track means,
 - c. track switch means,
 - d. a first section of said main line extending from a first end of said track switch means, and a second section of said line extending from a second end of said track switch means, said branch line means extending from said second end of said track switch means, said main line and said branch line each having first track means for supporting and guiding a rail going vehicle and second track means for supporting and guiding a rail going vehicle and track support means for supporting said first and second track means in elevated planes wherein said second track is located directly below said first track,

5

- e. said track switch means having first and second branch track means and first and second main track means,
 - f. first switch track support means for fixedly supporting said first branch track means and said first main line track means with respect to one another for transverse movement so as to selectively align said first track means of said main line track means of said switch means with said main line or to align said first track means of said first branch track means of said switch means with said first section of said main line and said branch line means,
 - g. second switch track support means for fixedly supporting said second branch track means and said second main line track means with respect to one another for transverse movement so as to selectively align said second track means of said main line track means of said switch means with respect to said first section of said main line and said first section of said branch line and means for moving said first and second transverse support means independently of one another.
2. An elevated railway system as claimed in claim 1 wherein said first and second switch track support means each comprise a plurality of transversely extending support beams and support post means disposed on opposite sides of said track means for slidably supporting said transversely extending support beams, said drive means including first longitudinal drive shaft means drivingly engaging the transverse beams of said first support means and second longitudinally extending drive shaft means drivingly engaging the transverse beams of said second support means, first drive motor means for driving said first longitudinal drive shaft means and second drive motor means for driving said second longitudinal drive shaft means.
3. An elevated railway system as claimed in claim 2 wherein said beams are arranged in closely adjacent spaced parallel pairs, each pair of beams consisting of one beam of said first transverse support means and one beam of said second transverse support means, each pair of beams being supported by one set of support posts.
4. An elevated railway system as claimed in claim 2 wherein said drive means include rack means carried by each of said transverse beam means and pinion means carried by said first and second longitudinally extending drive shaft means, said pinion means of said first longitudinally extending drive shaft drivingly engaging said rack means of said beam means of said first transverse support means and said pinion means of said second longitudinally extending drive shaft means drivingly engaging said rack means of said beam means of said second transverse support.
5. An electrified railway system comprising
- a. electrified track switching means having upper and lower main line and branch line electrified switch track sections,
 - b. a first section of upper main line electrified track means and a first section of lower main line electrified track means extending from one end of said track switch means,
 - c. a second section of upper main line electrified track means and a second section of lower main line electrified track means extending from the other end of said track switch means,

6

- d. a section of upper branch line electrified track means and a section of lower branch line electrified track means extending from said other end of said track switch means,
 - e. means for moving said upper and lower switch track means independently of one another connecting said first and second main line track sections and a second position connecting said first main line sections to said branch line sections,
 - f. electrical power transmission means for transmitting electrical power to each track section which is operably aligned with a switch track section,
 - g. electrical switch means in said power transmission means for interrupting the supply of power to each track section and each switch track section when out of operative alignment with one another.
6. An electrified railway system comprising
- a. electrified track switch means having upper and lower main switch track means and upper and lower branch line switch tracks means,
 - b. first switch track support means supporting said upper main line and upper branch line switch track means,
 - c. second switch track support means supporting said lower main line and lower branch line switch track means,
 - d. a first section of upper main line electrified track means and a first section of lower main line electrified track means extending from one end of said track switch means,
 - e. a second section of upper main line electrified track means and a second section of lower main line electrified track means extending from the other end of said track switch means,
 - f. a section of upper branch line electrified track means and a section of lower branch line electrified track means extending from said other end of said track switch means,
 - g. means for moving said first switch track support means independently of said second switch track support means to operably align said upper main line or said upper branch line switch track means to connect said first upper section of said main line to said second upper section of said main line or said upper section of said branch line,
 - h. means for moving said second switch track support means independently of said first switch track support means to operably align said lower main line or said lower branch line switch track means to connect said first lower section of said main line to said second lower section of said main line or said lower section of said branch line,
 - i. first electrical power transmission means for transmitting electrical power to said first section of upper main line track, said second section of upper main line track and said upper main line switch track means,
 - j. second electrical power transmission means for transmitting electrical power to said first section of upper main line track, said upper branch line switch track means and said section of upper branch line track means,
 - k. third electrical power transmission means for transmitting electrical power to said first section of lower main line track means, said second section of lower main line track means and said lower main line switch track means,

7

1. fourth electrical power transmission means for transmitting electrical power to said first section of lower main line track means, said section of lower branch line track means and said lower branch line switch track means,

m. first electrical switch means in said first electrical power transmission means for interrupting the electrical power supplied thereby when said upper main line switch track means is out of operative alignment with said first and second upper main line track sections,

n. second electrical switch means for interrupting the supply of electrical power through said second electrical power transmission means when said upper branch line switch track means is out of alignment with said first upper main line section and said upper branch track section,

o. third electrical switch means for interrupting the supply of electrical power through said third electrical power transmission means when the lower main line switch track means is out of alignment with said first and second lower main line track sections,

8

p. fourth electrical power switch means for interrupting the supply of electrical power through said fourth electrical power transmission means when said lower branch line switch track means is out of alignment with said first lower main line section and said lower branch track section.

7. A railway system comprising

a. track switching means having upper and lower main line and branch line switch track sections,

b. a first section of upper main line track means and a first section of lower main line track means extending from one of said track switch means,

c. a second section of upper main line track means and a second section of lower main line track means extending from the other end of said track switch means,

d. a section of upper branch line track means and a section of lower branch line track means extending from said other end of said track switch means,

e. means for moving said upper and lower switch track means independently of one another connecting said first and second main line track sections and a second position connecting said first main line sections to said branch line sections.

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