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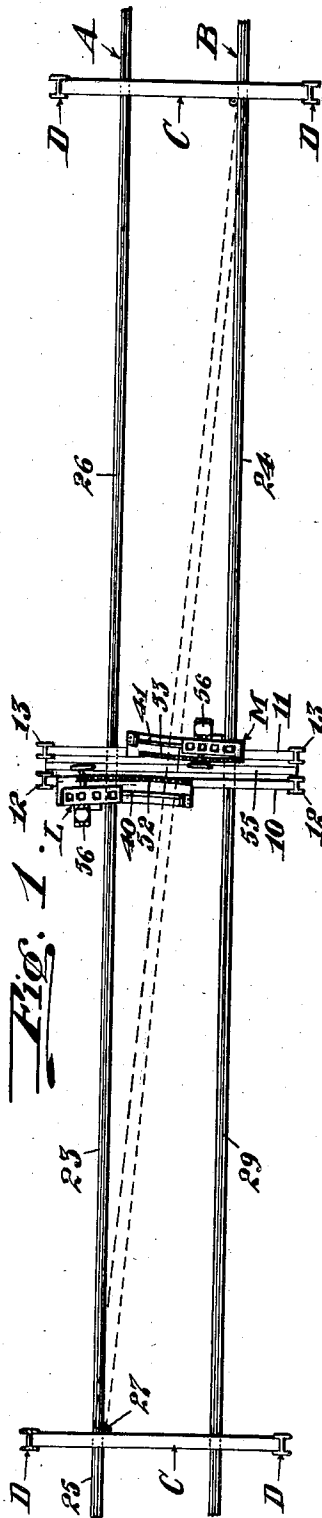
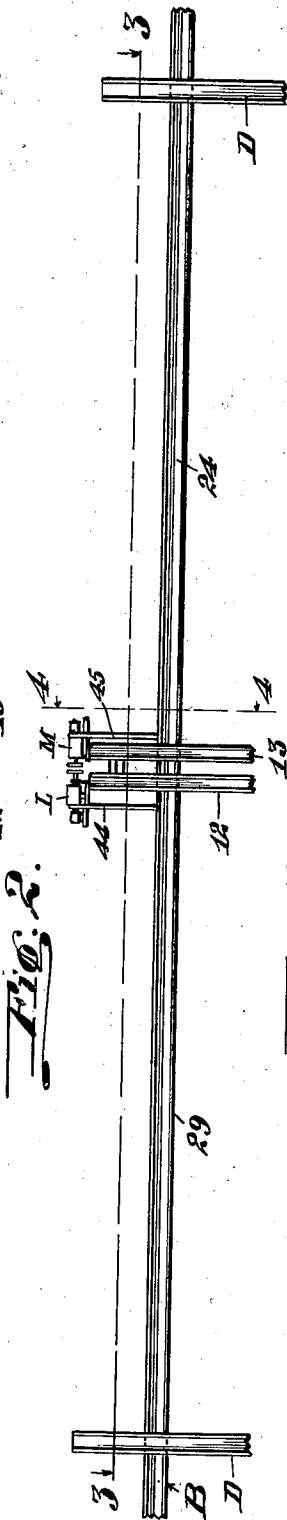
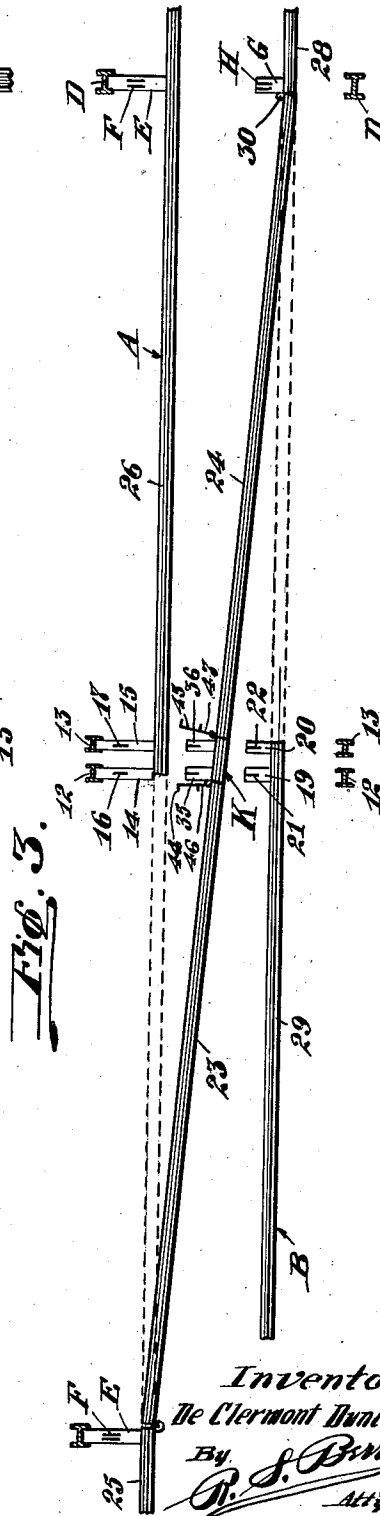
DE CLERMONT DUNLAP

2,005,133

MONORAIL SWITCH

Filed Nov. 4, 1933

3 Sheets-Sheet 1



Inventor
De Clermont Dunlap
By *P. J. Perry*
Att'y.

June 18, 1935.

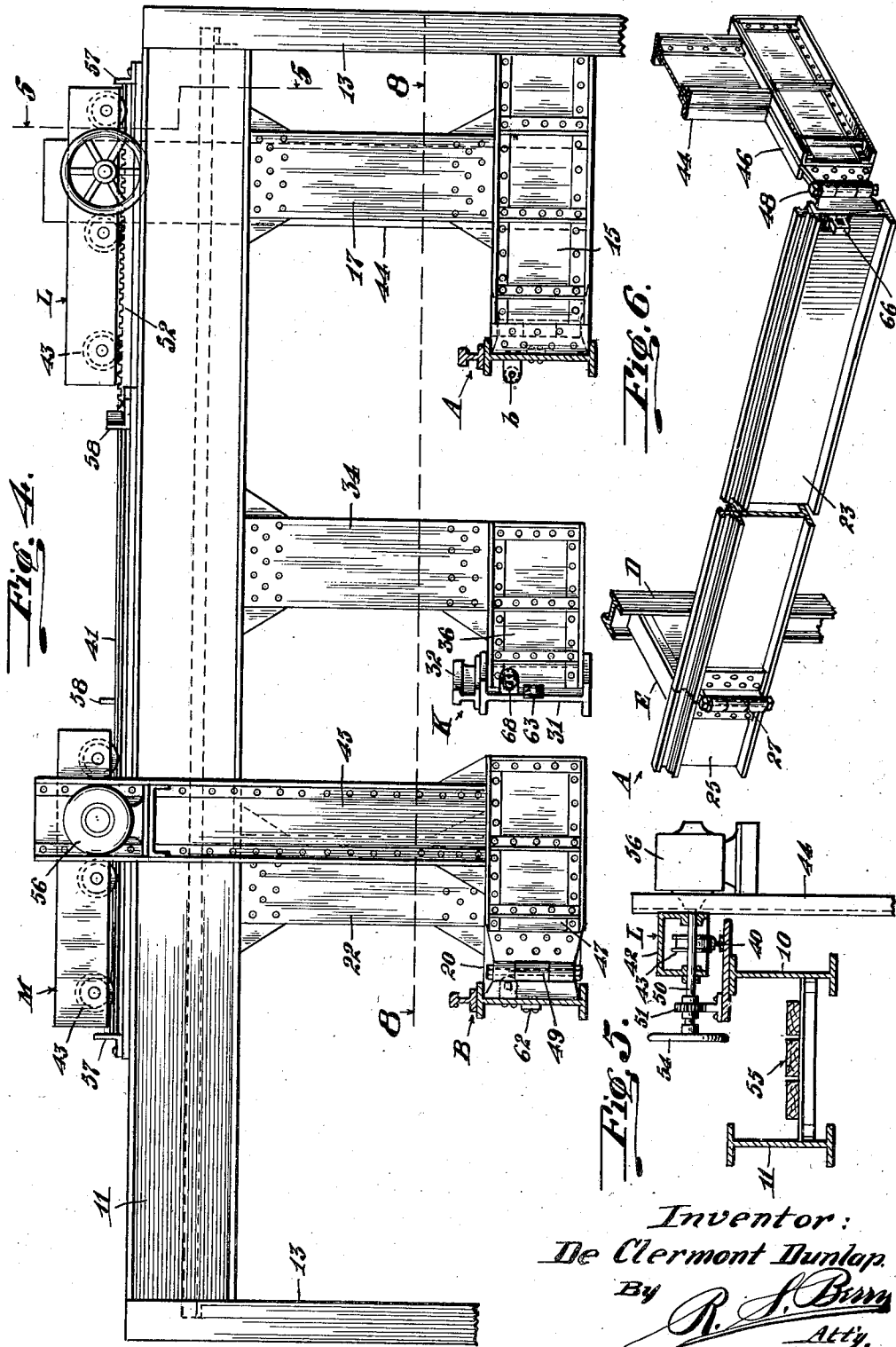
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MONORAIL SWITCH

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3 Sheets-Sheet 2



Inventor:
De Clermont Dunlap
By *R. S. Berry*
Atty.

June 18, 1935.

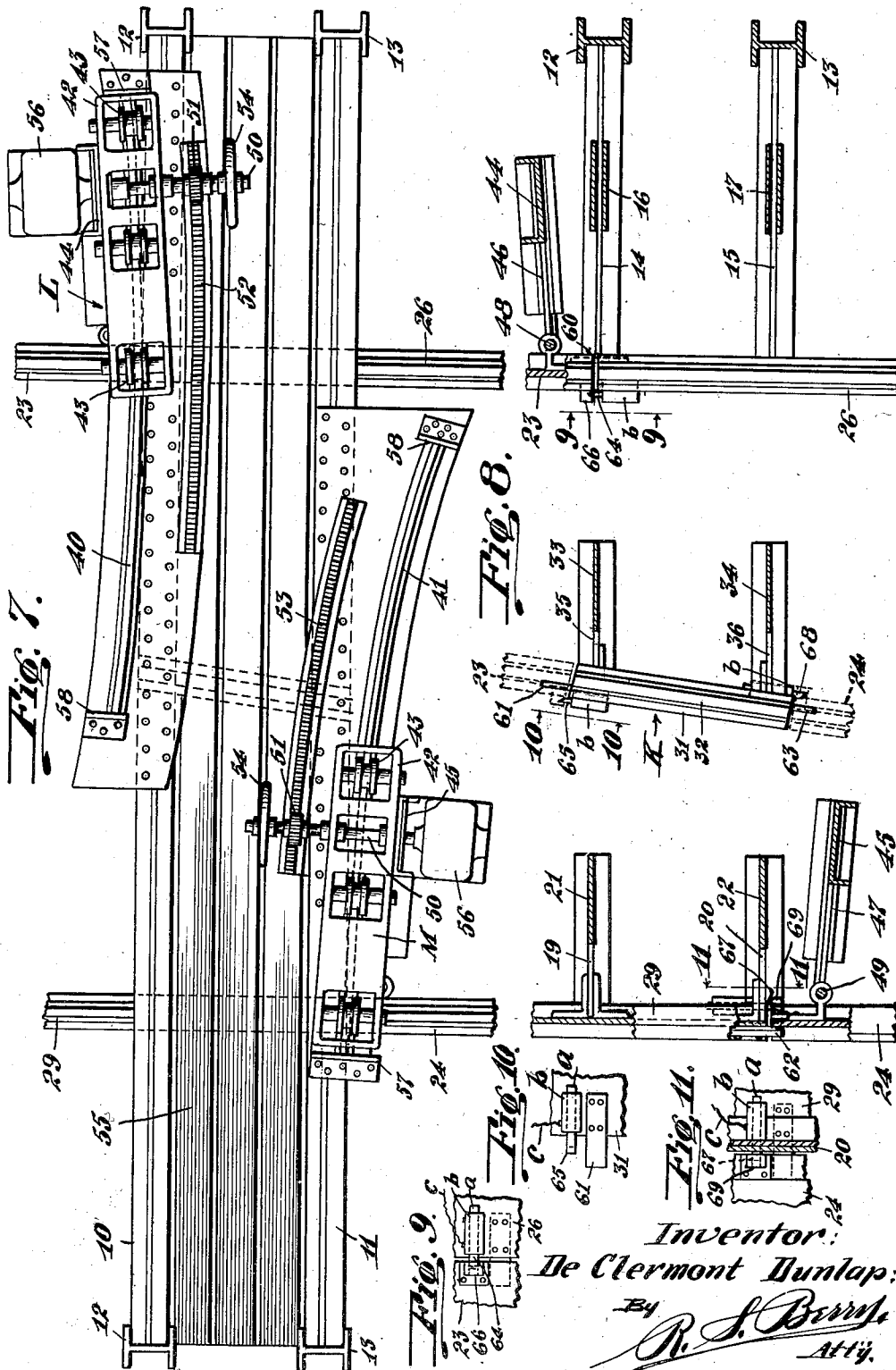
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,005,133

MONORAIL SWITCH

De Clermont Dunlap, Newark, N. J.

Application November 4, 1933, Serial No. 696,612

7 Claims. (Cl. 104—103)

This invention relates to a switch for monorail railway systems of the type in which cars or coaches are suspended from trucks mounted to traverse a single overhead rail.

5 An object of the invention is to provide an overhead monorail switch whereby a suspended monorail coach or train may be readily directed from one single rail or track to another and which is so formed as to be applicable to effect a crossover connection between a pair of monorail tracks spaced such distance apart as to permit coaches or trains traversing the contiguous tracks to pass each other.

10 Another object is to provide a switch of the above character which is adapted to form a connection between widely separated monorail tracks at such low angle of diversion from the course of the tracks to be interconnected as to afford but slight change in direction in the travel of coaches or trains in traversing the switch thereby permitting a crossover to be effected at high speed.

15 Another object is to provide a monorail switch which is so constructed as to permit of the passage from one side of a monorail track to the other of hangers employed in suspending a coach in a position beneath the track from a truck mounted to traverse the track.

20 Another object is to provide a construction whereby lengths of a pair of monorail tracks may be swung to extend in alignment with each other diagonally between a pair of spaced tracks, and whereby the ends of such swung lengths may be interconnected to form a continuous diagonal track leading from one of the tracks of the pair to the other.

25 Another object is to provide a crossover or switch for overhead monorail tracks which is so formed as to effect connection between suspended overhead rails.

30 A further object is to provide an effective mechanism for operating the switch which is adapted to be operated either manually or by means of a motor.

35 With the foregoing objects in view together with such other objects and advantages as may subsequently appear, the invention resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed, and illustrated, by way of example, in the accompanying drawings in which:

40 Figure 1 is a diagrammatic plan view of the switch showing it in its open position in full lines and in its closed or operating position in dotted

lines, and illustrating the mode of operation thereof;

Figure 2 is a view in side elevation of the structure shown in Figure 1;

Figure 3 is a plan view and horizontal section taken on the line 3—3 of Figure 2 showing the switch as disposed in its closed or crossover position;

Figure 4 is a view in cross section and elevation as seen on the line 4—4 of Figure 2 showing the switch operating mechanism;

Figure 5 is a detail in vertical section, with parts shown in elevation, as seen on the line 5—5 of Figure 4;

Figure 6 is a detail in perspective with parts broken away depicting one of the swinging switch elements and the manner of mounting same;

Figure 7 is a plan view of the switch operating mechanism shown in Figure 4;

Figure 8 is a plan view and horizontal section taken on the line 8—8 of Figure 4 with parts broken away, depicting on scale larger than that of Figure 3, the means for effecting connection between the pair of swinging switch elements, but in which view the switch elements are shown in their normal open positions;

Figure 9 is a detail in elevation taken on the line 9—9 of Figure 8;

Figure 10 is a detail as seen on the line 10—10 of Figure 8;

Figure 11 is a section taken on the line 11—11 of Figure 8.

Referring to the drawings more specifically, A and B indicate generally a pair of spaced monorail tracks each of which is designed to afford a track to support and be traversed by the trucks of a monorail coach suspended from the trucks and disposed beneath the tracks; the tracks being spaced apart such distance as to permit the passage relatively to each other of coaches or trains traveling thereon.

The tracks A and B are suspended in spaced relation to the ground from transverse overhead beams spaced at suitable intervals apart throughout the length of the railway, and which beams are carried on uprights which may be supported in any desired manner. In Figure 1 of the drawings the transverse overhead beams are shown as including spaced beams C carried on columns D, and also including a pair of contiguous but spaced beams 10 and 11 carried respectively on pairs of columns 12 and 13, which pair of beams are located intermediate the beams C in spaced relation thereto and afford a support for the

operative elements of the switch structure embodied in the present invention.

In order to accommodate the overhead tracks A and B to the purpose for which they are intended, the tracks are suspended in such fashion as to permit the passage lengthwise thereof of hangers employed in carrying coaches located beneath the tracks in a dependent position from trucks superimposed on the tracks, which coach carrying hangers depend alongside the tracks. For this purpose each of the tracks A and B is supported by connections leading laterally from the side thereof opposite that traversed by the coach carrying hangers. It follows that where it is desired to transfer a suspended coach or train from one of the tracks to the other it is essential that the supporting connection to the two tracks A and B be connected thereto on corresponding sides thereof.

This is accomplished in the construction here shown by supporting the track A on brackets E affixed to hangers F carried by the beams C and also by brackets 14 and 15 affixed to hangers 16 and 17 carried by the pair of beams 10 and 11; and by supporting the track B on brackets G on hangers H carried by the beams C and also by brackets 19 and 20 affixed to hangers 21 and 22 depending from the pair of beams 10 and 11. The several hangers depend from the overhead beams in lateral offset relation to the tracks, and the several brackets project from their respective hangers in corresponding directions to connect with the tracks A and B on corresponding sides thereof.

While the tracks A and B may be variously constructed they are here shown as embodying I-beams with rails carried thereon, and to which I-beams the supporting brackets are attached.

In carrying out the present invention the tracks A and B are provided respectively with lengths or sections 23 and 24 adapted to be swung horizontally from their normally aligned positions relative to the tracks A and B to extend diagonally between the rails A and B in alignment with each other to effect a connection between the tracks. The section 23 is interposed between longitudinally spaced fixed beams 25 and 26 of the track A and is connected by a hinge 27 to the outer end of the fixed beam 25 to swing in and out of alignment with the fixed beam 26; and the section 24 is interposed between longitudinally spaced fixed beams 28 and 29 of the track B and is connected by a hinge 30 to one end of the fixed beam 28 to swing in and out of alignment with the fixed beam 29, as particularly shown in Figure 3. The hinged rail sections 23 and 24 may be formed of any suitable lengths, being designed according to the loads they are intending to carry and also according to the angular position they are intended to assume relatively to their associated tracks when disposed in their diagonal cross-over position.

As a means for spanning a gap formed between the ends of the hinged rail sections 23 and 24 when the latter are swung to their aligned position, a fixed section of track K is provided intermediate the tracks A and B, which section of track K extends diagonally in an angular relation to the tracks A and B corresponding to the angular relations of the track sections 23 and 24 to the tracks A and B when disposed in their aligned diagonal position. The track section K is of such length and is so disposed that its opposite ends will meet the outer ends of the hinged track sections 23 and 24 to form continua-

tions thereof and extend in alignment therewith when said track sections 23 and 24 are positioned to extend in alignment with each other.

The track section K, here shown as comprising an I-beam 31 and a rail 32 carried thereon, is supported in a dependent position by a pair of hangers 33 and 34 fitted with horizontally extending brackets 35 and 36 which latter are affixed to one side of the track section K adjacent the ends thereof; the brackets 35 and 36 extending from the hangers 33 and 34 in a direction corresponding to the direction of projection of the track supporting brackets 14—15 and 19—20 from the hangers 16—17 and 21—22 and accordingly connect with the track section K on the side thereof corresponding to the sides of the tracks A and B with which the various track supporting brackets connect so that when the track sections 23 and 24 are positioned in alignment with each other, as shown in full lines in Figure 3, coach supporting hangers may pass alongside the track section K.

The hangers 33 and 34 are secured to the pair of parallel beams 10 and 11 from which beams depend the hangers 16—17 and 21—22, before referred to, and which last named hangers afford supports for the end portions of the fixed beams 26 and 29 of the tracks A and B.

In the construction here shown, the fixed track sections 26 and 29 terminate to meet the outer ends of the hinged track sections 23 and 24 when the latter are disposed in alignment therewith, and their outer terminal portions extend in overlapped but spaced relation to each other so as to afford sufficient space between the outer ends of the hinged track sections 23 and 24 to accommodate a substantial length of the intermediate track section K and also to accommodate supports for the outer ends of the hinged track sections and an overhead operating mechanism carried on the beams 10 and 11 hereinafter described.

Mounted on the overhead beam 10 is a horizontally extending arcuate rail 40 formed on an arc extending concentric with the axis of the hinge 27 and carried on the beam 11 is a horizontally disposed arcuate rail 41 formed on an arc concentric with the hinge 30. Mounted to travel on the rails 40 and 41 are carriages L and M each of which includes a frame 42 fitted with a series of spaced rollers 43 adapted to traverse the rails 40 and 41, and affixed to the carriages L and M are depending hangers 44 and 45 on the lower portions of which are carried horizontally projecting brackets 46 and 47 connected by hinges 48 and 49 to the outer ends of the hinged track sections 23 and 24 respectively, as particularly shown in Figure 8; the brackets 46 and 47 connecting with the sections 23 and 24 on the sides thereof corresponding to the sides of the rails A and B from which their supporting brackets extend.

The carriages L and M afford traveling supports for the outer ends of the hinged rail sections 23 and 24 and whereby on shifting the carriages L and M longitudinally of the rails 40 and 41 the track sections 23 and 24 may be swung laterally on their respective hinges 27 and 30.

As a means for facilitating movement of the carriages L and M along their tracks each of the carriages is fitted with a revoluble shaft 50 on which is fixed a toothed wheel 51, and extending concentric with the arcuate rails 40 and 41 are arcuate racks 52 and 53 with which the toothed wheels 51 engage in such manner that on rotation of the latter the carriages L and M will be caused

to advance on the rails 40 and 41. The shafts 51 are fitted with hand wheels 54 whereby the shafts may be rotated manually to effect movement of the carriages; a platform 55 being provided between the beams 10 and 11 to accommodate an operator.

Each of the carriages L and M is shown as equipped with a motor 56 the shaft of which is connected to the shaft 50 whereby the latter may be power driven; it being contemplated to ordinarily impel the carriages by operation of the motors and to employ manual propulsion thereof in emergencies.

Suitable stops 57 and 58 are provided at the ends of the rails 40 and 41 to limit movement of the carriages L and M in either direction.

Means are provided for detachably connecting the outer end portions of the hinged track sections 23 and 24, hereinafter referred to as switch sections, in alignment with their associated fixed track sections 26 and 29, and also to effect detachable connection between the ends of the switch sections 23 and 24 and the ends of the track section K, so as to securely hold the switch sections 23 and 24 against accidental displacement.

This means is here shown as including stops 60 and 61 on the fixed track section 26 and the intermediate track section K respectively for limiting swinging movement of the switch section 23, stops 62 and 63 on the fixed track section 29 and the intermediate track section K respectively for limiting swinging movement of the switch section 24, and also as including electrically operated catches 64 and 65 on the track sections 27 and K respectively adapted to engage a keeper 66 on the switch section 23 and electrically operated catches 67 and 68 on the track sections 29 and K respectively adapted to engage a keeper 69 on the switch section 24. The catches 64, 65, 67 and 68 are here shown as affixed to reciprocal cores *a* of solenoid magnets *b* embodying oppositely wound coils alternate energization of which will effect reciprocation of the cores *a* to advance and retract the catches thereon as will be readily understood. Electrical current is directed to the solenoid magnets as occasion may require through conductors *c* which lead from the coils of the magnets to any suitable switch control mechanism not necessary to be here shown.

In the operation of the invention the switch sections 23 and 24 are disposed in alignment with their associated track sections 25—26 and 28—29 respectively when it is desired to direct monorail cars or trains along either or both the monorail tracks A and B past the switch or cross-over; the switch sections then being interconnected at their outer ends to the fixed track sections 26 and 29 by the catches 64 and 67 which are then engaged with the keepers 66 and 69 on the switch sections 23 and 24 respectively. The switch sections will then be disposed as shown in Figure 1.

When it is desired to direct cars or trains from the track A to the track B or vice versa, the catches 64 and 67 are disengaged from the keepers 66 and 69 whereupon the carriages L and M are set in motion by rotating the shafts 50 thereon to cause the toothed wheels 51 on said shafts to traverse the racks 52 and 53 and thereby shift the carriages on their supporting rails 40 and 41. Rotation of the shafts 50 may be effected either by means of the motors 56 or by manual operation of the hand wheels 54 as before described.

Movement of the carriages L and M toward each other will advance the outer ends of the

switch sections 23 and 24, which sections will then swing on their hinges 27 and 30 toward the opposed rails 29 and 26 until the carriages have been moved such distance as to bring the outer ends of the switch sections against the stops 61 and 63 on the intermediate track section K whereupon the switch sections will extend in alignment with each other and with the section K.

The catches 65 and 68 are then engaged with the keepers 66 and 69 so as to effect secure connection between the switch sections and the intermediate section K. The switch sections will then be disposed as shown in Figure 3, whereupon a cross-over from one track to the other may be effected.

The switch sections are restored to their normal position by reversing the operation just described.

I claim:

1. A monorail switch comprising in combination, a pair of monorail tracks, a hinged section in each of said tracks, said hinged section being mounted to swing into alignment with each other, and a track section arranged to extend between contiguous ends of said hinged sections when the latter are aligned.

2. A monorail switch comprising in combination, a pair of monorail tracks, a pivoted track section in each of said tracks, said track sections being adapted to be swung to extend into alignment with each other, and a fixed track section disposed intermediate the pair of monorail tracks in angular relation thereto and arranged to extend between the contiguous ends of said pivoted track sections when the latter are aligned and in longitudinal alignment therewith.

3. A monorail switch comprising in combination, a pair of monorail tracks, a pivoted track section in each of said tracks, said track sections being adapted to be swung to extend into alignment with each other, a fixed track section disposed intermediate the pair of monorail tracks in angular relation thereto and arranged to extend between the contiguous ends of said pivoted track sections when the latter are aligned and in longitudinal alignment therewith, and means for effecting detachable connection between the ends of said fixed track section and the contiguous ends of said pivoted track sections.

4. In a monorail switch, a pair of hinged track sections arranged to be swung into longitudinal alignment with each other, overhead arcuate rails extending in transverse relation to the outer end portions of said hinged track sections, a carriage mounted to traverse each of said rails, and hangers depending from said carriages connected to the outer end portions of said hinged track sections.

5. A monorail switch comprising in combination, a pair of overhead monorail tracks, a hinged track section in each of said tracks, said hinged track sections being adapted to be swung into alignment with each other diagonally between said pair of monorail tracks, a pair of carriages arranged to travel transversely of said monorail tracks in superimposed relation thereto, depending connections between said carriages and the outer end portions of said hinged track sections, and means for impelling said carriages including toothed racks, toothed wheels engaged with said racks, and revoluble shafts carried by said carriages on which said toothed wheels are mounted, and means for rotating said shafts.

6. In a monorail switch, a pair of monorail tracks each including spaced fixed track sections, hinged track sections mounted to extend between said spaced fixed track sections and adapted to be swung into alignment with each other, means for detachably connecting the outer ends of said hinged track sections to the ends of contiguous fixed track sections, means for detachably connecting the outer ends of said hinged track sections together, and means suspendedly supporting the outer ends of said hinged sections movably mounted to effect swinging movement of said hinged sections.

7. In a monorail track system, a pair of monorail tracks, depending supports for said tracks connected thereto to project from one side thereof with the connections leading from corresponding sides thereof, a hinged section in each of said tracks mounted to swing inwardly toward and into alignment with each other, and depending supports connected to the outer end portions of said hinged sections leading from the sides thereof corresponding to the sides of said tracks from which their supporting connections lead.

DE CLERMONT DUNLAP.