Sept. 8, 1964 W. F. APPELT ETAL 3,147,714

ELEVATED TRACK AND STRUCTURE FOR SUPPORTING A COACH FOR MOVEMENT THEREALONG

Filed Dec. 26, 1957 4 Sheets-Sheet 1

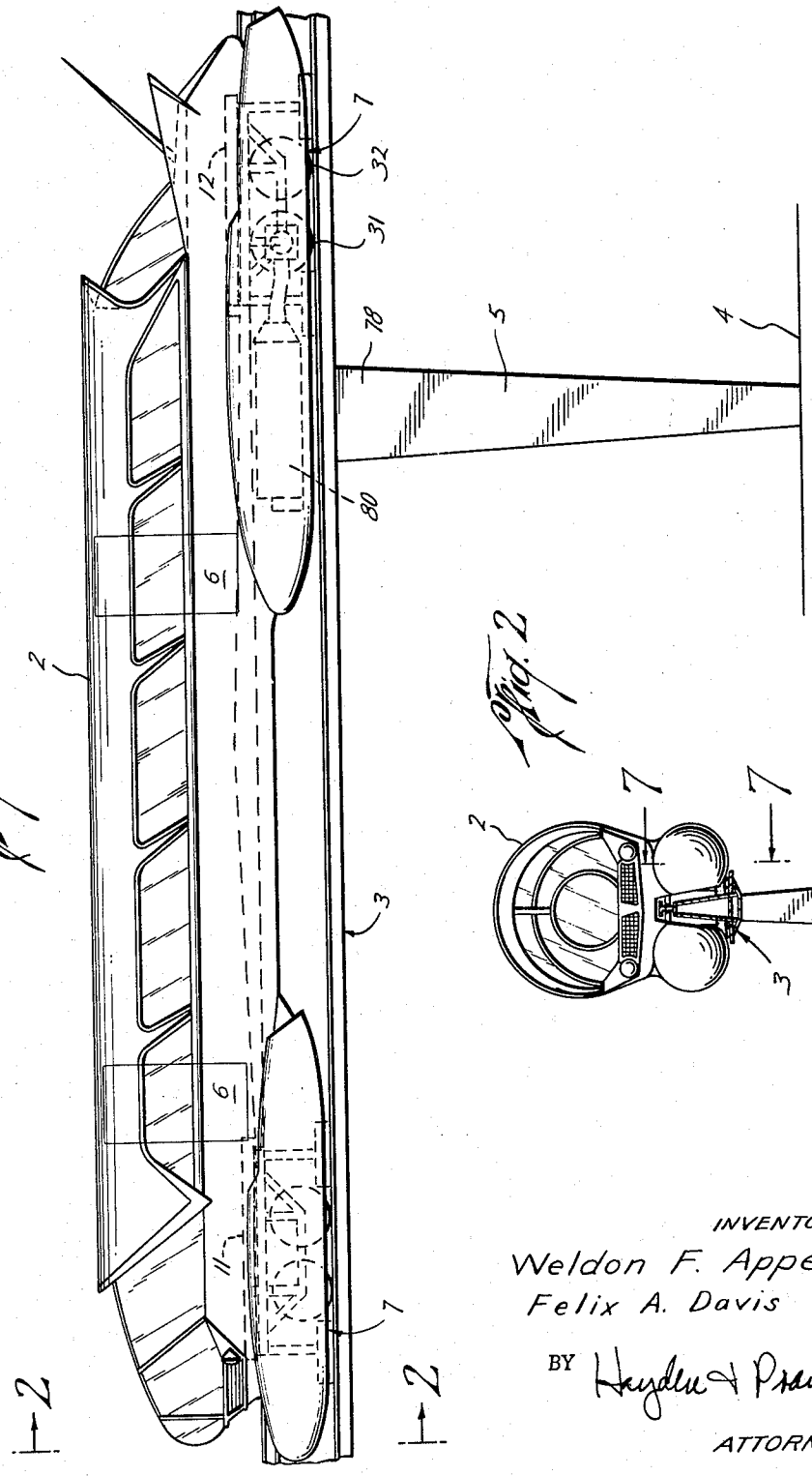


Fig. 1

Fig. 2

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Filed Dec. 26, 1957 4 Sheets-Sheet 2

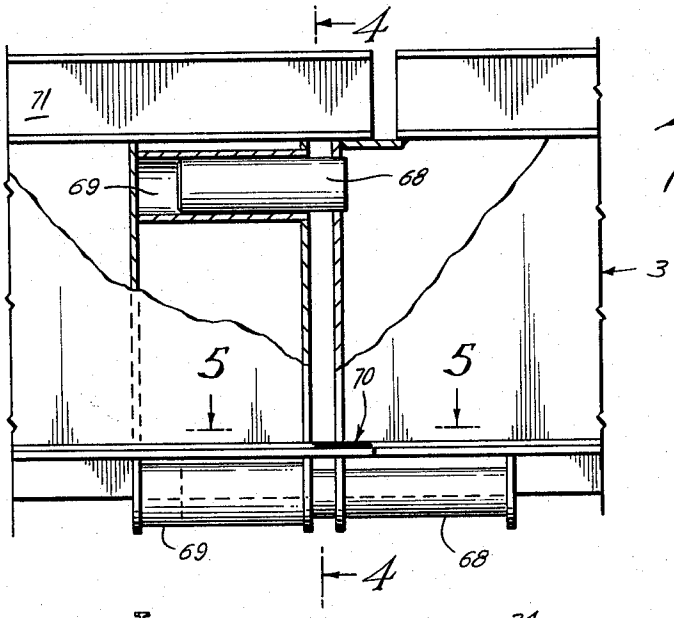


Fig. 3

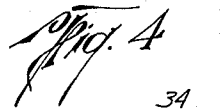


Fig. 4

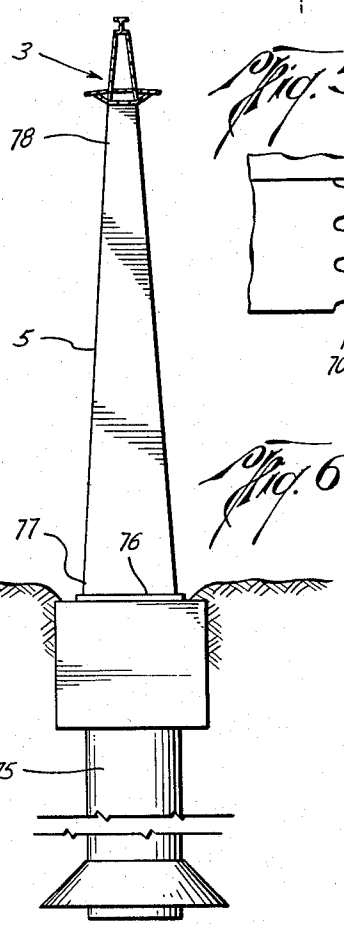


Fig. 5

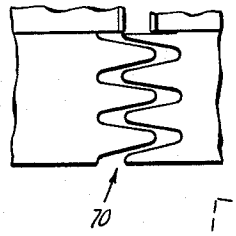
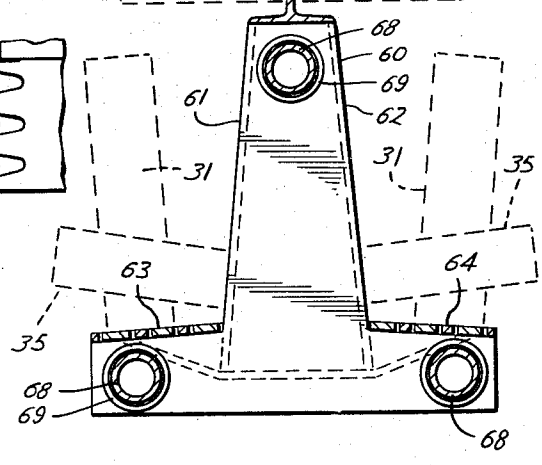


Fig. 6



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Fig. 7

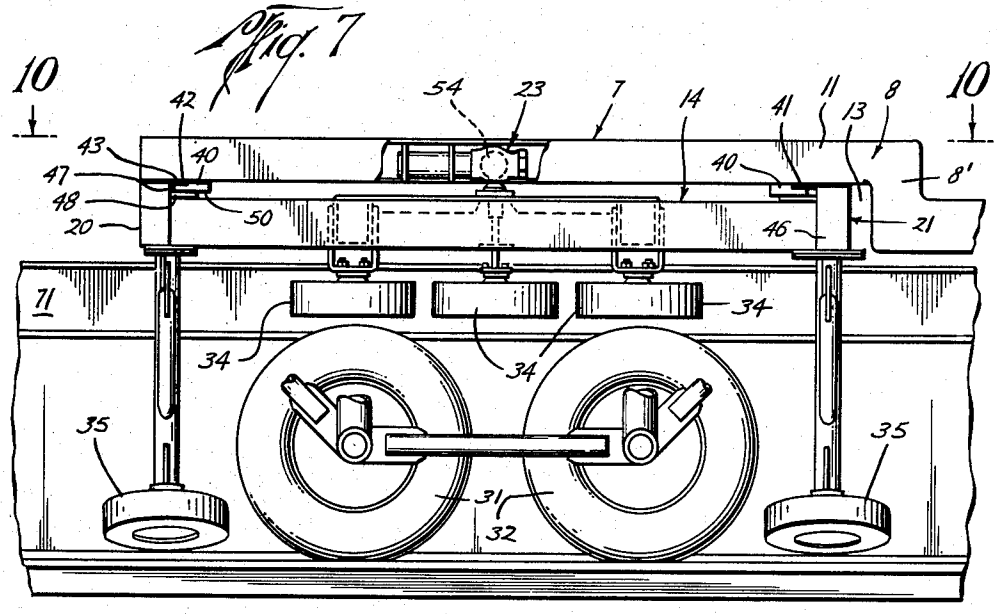
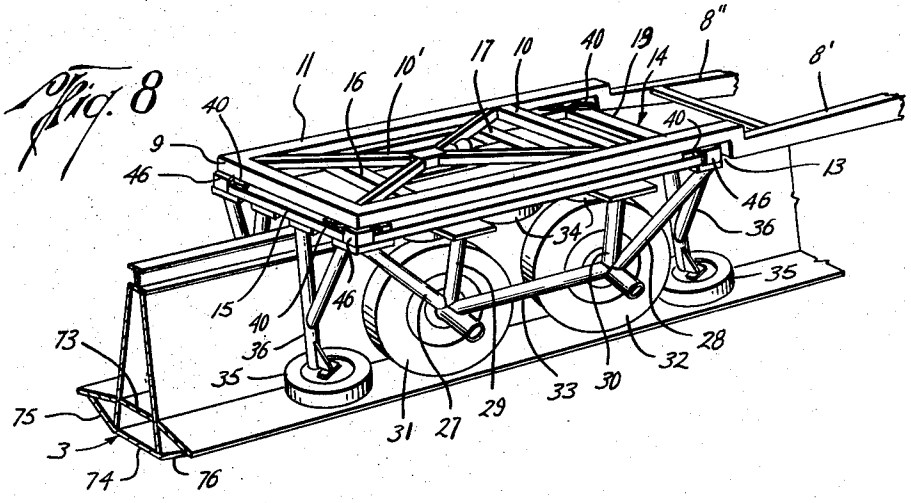


Fig. 8



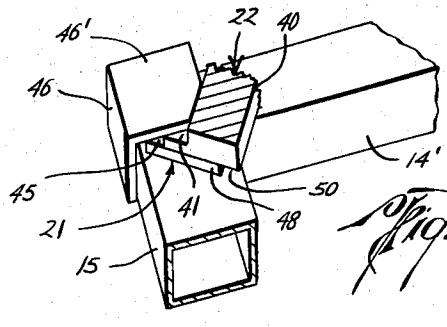


Fig. 9

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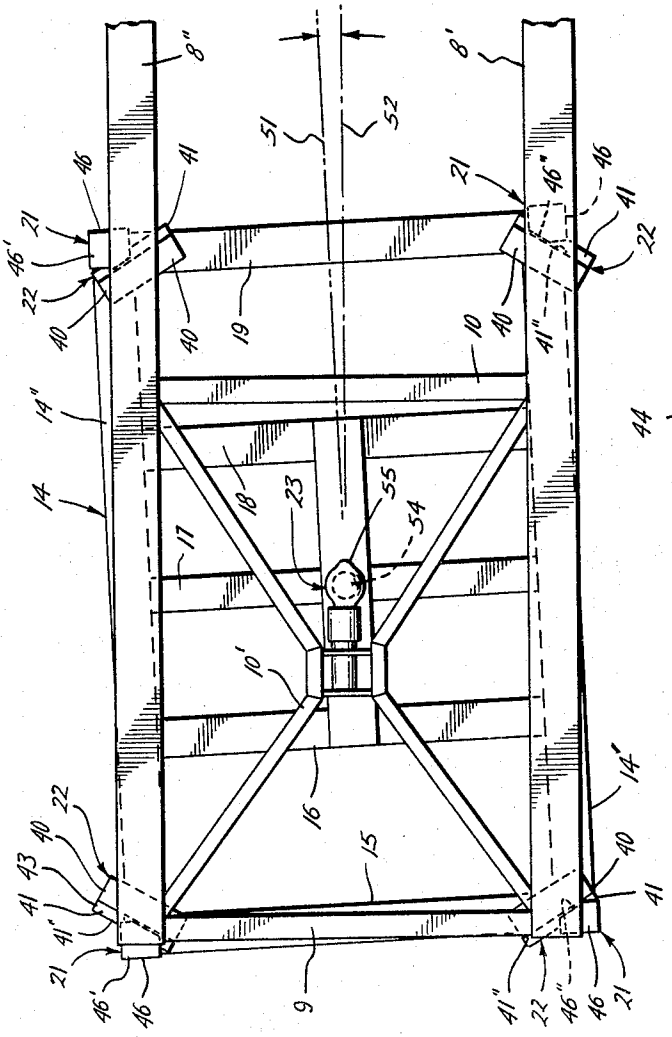


Fig. 10

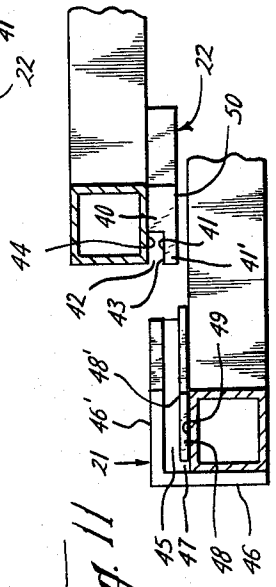


Fig. 11

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United States Patent Office 3,147,714 Patented Sept. 8, 1964

3,147,714

ELEVATED TRACK AND STRUCTURE FOR SUPPORTING A COACH FOR MOVEMENT THEREALONG

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Filed Dec. 26, 1957, Ser. No. 705,410
3 Claims. (Cl. 105—145)

The present invention relates to an elevated track and structure for supporting a coach for movement along the elevated track.

Various structures have been proposed and used with varying degrees of success for accommodating the movement of a coach in elevated relationship relative to the earth's surface. Generally, the structural arrangement of the support for the coach has been undesirable in that such structure places the support wheels for the coach which carry the coach along the elevated track in a position relative to the interior of the coach so that unnecessary track noise is easily conveyed to the interior of the coach. Furthermore, the arrangement of the support wheels in prior constructions has been such that the center of gravity of the coach is relatively high, thus affecting the overall stability of the coach, such instability causing unnecessary swaying and rolling of the coach as it moves along the track and increasing its tendency to ride off the elevated track.

Additionally, the track constructions heretofore used for elevated coaches have been cumbersome, unduly bulky, which unnecessarily increases the cost per mile of track and may even affect the riding qualities of the coach upon the track.

The present invention is directed to a support structure for a coach on an elevated track which support structure lowers the center of gravity of the coach so as to aid in stabilizing the coach as it moves along the track.

Still a further object of the present invention is to provide a support structure for a coach on an elevated track, which support structure is provided with wheels for accommodating movement of the coach along the track and bearing means mounted on the support structure for engaging the track above and below the axis of rotation of the support wheels to inhibit the rolling of the coach about the track as it moves therealong.

Still a further object of the present invention is to provide a track construction along which an elevated coach may move, such track construction including a main body extending substantially vertically upwardly and having sloping side surfaces, lateral projections adjacent the lower end of the main body and integrally connected therewith, said lateral projections providing surfaces for accommodating movement of the coach along the track.

Yet a further object of the present invention is to provide a support frame structure for supporting a coach on an elevated track, which frame is provided with wheels whereby the coach may be moved along the track, there being means provided for accommodating lateral movement between the wheels and the support structure, said last named means inhibiting relative vertical movement between the coach wheels and the support frame structure.

Other objects and advantages of the invention will become more readily apparent from a consideration of the following description and drawings, wherein:

FIG. 1 is a side elevation showing a portion of the track with a coach thereon with the support frame of the present invention being illustrated in dotted line;

FIG. 2 is a view on the line 2—2 of FIG. 1 illustrating further the relationship of the track to the coach, as well as the arrangement of the support wheels mounted on the frame for moving the coach along the track;

FIG. 3 is an enlarged side view, partly in section, illustrating the manner by which adjacent sections of rail may be connected together;

FIG. 4 is a sectional view on the line 4—4 of FIG. 3, partly in elevation, further illustrating the relationship of adjacent track sections as well as structural details of the track;

FIG. 5 is a view on the line 5—5 of FIG. 3, showing a means for interconnecting adjacent lateral sections of the track together upon which the support wheels move to accommodate movement between adjacent sections without interrupting the surface upon which the coach wheels move;

FIG. 6 is a view showing the preferred form of the column arrangement for supporting the track in elevated position and a suitable foundation for supporting the column.

FIG. 7 is a view on the line 7—7 of FIG. 2 showing in enlarged form the structural details and arrangement of the frames for supporting the coach on the elevated track;

FIG. 8 is a perspective view of the details of the frames as illustrated in FIG. 7 to further illustrate the relationship of the frame components in relation to each other and in relation to the track;

FIG. 9 is an enlarged perspective view of a portion of the frame support illustrating certain structural details thereof;

FIG. 10 is a plan view of the frames shown in FIGS. 7 and 8 to further illustrate the relationship of structural components thereof; and

FIG. 11 is a partial exploded view which illustrates the bearing surfaces of the frames in greater detail.

Attention is directed to FIG. 1 of the drawings wherein a coach 2 is illustrated on the elevated rail generally denoted by the numeral 3, which rail 3 is supported in relation to the earth's surface 4 by means of the column 5.

The coach 2 is of suitable construction to accommodate either passengers or cargo, the form illustrated in FIG. 1 being suitable for passenger use. Ingress and egress to the coach 2 may be had by means of the doors 6 illustrated in FIG. 1 in the side of the coach 2. Additionally the coach 2 may be provided with coupling means (not shown) adjacent the ends thereof whereby additional coaches may be connected thereto for movement along the elevated rail 3, if desired.

A structure for supporting the coach 2 on the elevated rail 3 is indicated generally by the numeral 7, which structure is shown in dotted line in FIG. 1. The support structure for the coach 2 is shown in more detail in FIGS. 7, 8, 9, 10 and 11, and attention is directed to these figures wherein the structure 7 is shown as including a frame denoted generally at 8, the frame 8 including laterally spaced beams 8′ and 8″ which extend longitudinally of the coach 2 as shown in dotted line in FIG. 1 and are secured by any suitable means to the nether part or to the lower side of the coach 2. Suitable members as shown at 9, 10 and 10′ are provided at intervals throughout the longitudinal length of the frame members 8′ and 8″ for securing the frame 8 together to form a structure of suitable strength for the purposes to be described in more detail hereinafter.

The frame 8 includes integral end portions 11 and 12 as shown in dotted line in FIG. 1 of the drawings. The integral end portions 11 and 12 are upset vertically relative to the remainder of the frame 8 which extends between the portions 11 and 12, and the end portions

extend in a plane substantially parallel to the remainder of the frame 8. The upset relationship of the integral end portions 11 and 12 provides a recess 13 adjacent each end of the frame 8 in which is adapted to be received an additional frame structure designated generally by the numeral 14.

The additional frame structure 14 includes the longitudinally extending spaced members 14' and 14'' which are maintained in spaced relation by the lateral tie members 15, 16, 17, 18 and 19 as illustrated more clearly in FIG. 10 of the drawings. The additional frame 14 is of a length so that it fits within the recess 13 and extends to the end of the frame 8 as shown at 20 in FIG. 7.

The interconnecting lateral members 15, 16, 17, 18 and 19 of the frame 14 afford additional rigidity and strength to the frame 14 and it will be noted that the frame 14 is rectangular in plan view, which conforms generally to the configuration of the end portions 11 and 12 of the frame 8 and also conforms to the general shape of the recess 13 formed by each of the upset end portions 11 and 12.

The members 8', 8'', 9, 10 and 10' of the frame 8, as well as the members 14', 14'', 15, 16, 17 and 18 of the frame 14 may be formed of any suitable structural members to accommodate the loads, stresses and strains to be encountered in any given situation.

Bearing means denoted generally at 21 at each corner of the rectangular frame 14 are provided for engaging with the bearing means designated generally by the numeral 22 on the frame 8 and provide a means for securing the additional frame 14 to the longitudinally extending coach frame 8, as will be pointed out in more detail hereinafter. The bearing means 21 and 22 on the frame 14 and the frame 8 respectively cooperate to accommodate relative pivotal movement between the frames 8 and 14 while inhibiting relative vertical movement therebetween.

Additionally, means denoted generally by the numeral 23 in FIG. 10 are provided for further securing the frames the frames 8 and 14 together to accommodate relative pivotal movement therebetween, while inhibiting relative vertical movement therebetween.

Secured to each side of the frame 14 are the fore and aft depending members 27 and 28 as well as the members 29 and 39, the members 27 and 29 joining to provide a support structure for the wheel 31 which is adapted to ride on the track 3. Similarly, the members 28 and 30 depending from the frame 14 on each side thereof are joined at their lower ends to provide a support for maintaining the wheel 32 in proper position whereby the frame 14 and the frame 8 secured thereto, as well as the coach mounted on the frame 8 may be moved along the track 3. Additional structural support members may be provided between the frame 14 and the wheels 31 and 32, which support the coach on the track 3 if necessary and as desired, depending upon the type load to be carried in the coach 2. A member 33 extends between the juncture of the supports 27 and 29 and the juncture of supports 28 and 30 to afford additional strength and rigidity to the members which hold the support wheels 31 and 32 in relation to the frame 14.

The above arrangement provides spaced wheels on each side of the frame 14 for riding on the track 3 as will be pointed out in more detail hereinafter.

In order to inhibit rolling or swaying of the coach 2 on the elevated track 3 as it moves therealong, rotatable members denoted generally by the numeral 34 are provided, which members are mounted on the frame 14 and are adapted to engage the track 3 in a plane substantially at 90° relative to the vertical axis of rotation of the support wheels 31 and 32. Of course, as mentioned before, the support wheels 31 and 32 are provided on each side of the frame 14 and similarly, the roller means 34 are provided on each side of the frame, one side only being illustrated in FIGS. 7 and 8.

It is to be further noted that the roller means 34 engage the track 3 above the horizontal axis of rotation of the wheels 31 and 32, and in order to provide additional rigidity and additional means for inhibiting rolling or swaying of the coach 2 as it moves along the elevated track 3, rotatable members 35 are provided which also depend from the frame 14 by any suitable support means such as the supports 36, shown in the drawings, which rotatable members 35 are adapted to engage the track 3 below the horizontal axis of rotation of the wheels 31 and 32 on each side of the frame 14. Furthermore, the members 35 are spaced at each end of the frame 14 before and behind the wheels 31 and 32 as shown in FIG. 7, while the members 34 are arranged above and substantially between the vertical axes of the wheels 31 and 32. Three rotatable members 34 are shown in FIGS. 7 and 8, but it seems obvious that any suitable number may be used in order to accomplish the results of the present invention. The rotatable bearing members 34 and 35 may take any suitable form, and as shown in the drawings, they are in the form of rubber covered wheels to aid in eliminating noise and friction as the coach 2 moves along the track 3.

The rotatable members 34 are illustrated in dotted line in FIG. 4 engaging each side of the track 3 above the support wheels 31, 32, also shown in dotted line. The wheels 35 are also shown in dotted line in FIG. 4 engaging each side of the track 3, to further clarify the relationship of the wheel bearing members to each other and to the load or support wheels, as well as to the track 3.

The structural details of the bearing means 21 and 22 are illustrated in FIGS. 9, 10 and 11 of the drawings.

The bearing means 22 on frame 8 consists of a plate 40 which is secured to the corners of each of the rectangular end portions 11 and 12. The plate 40 is secured to the lower side of the frame 8 at the end portions 11 and 12 and faces as shown in FIGS. 7 and 11. Each plate 40 is provided with a cut-away portion 41, thereby providing a space 42 between the top surface 43 of the projection 41' formed by the cut-away and the bottom surface 44 of the longitudinal frame members 8' and 8''. The projection 41' formed on plate 40 is adapted to fit within the recess 45 formed in the bearing means 21.

The bearing means 21 is provided at each corner of the rectangular frame 14 as previously mentioned, and consists of an upstanding member 46 which is secured to the frame 14 on each corner and has a rectangular top 46' in horizontal spaced relation to the top of each of frame members 14', 14'' and the lateral connections therebetween to form a recess 47 between the top 46' and each of the frame members 14' and 14''. A plate 48 is mounted as shown at 49 on the frame 14 at each corner, and the bottom surface 50 of the plate 40 on the frame 8 is adapted to bear on the top 48' of the plate 48. The projection 41' of the plate 40 is adapted to fit within the recess 45 between the top 46' of the member 46 and the top of frame 14. The projection 41' is slightly thinner than the recess 45, and the top 48' of plate 48 bears against the bottom 50 of the plate 40. The adjacent abutting surfaces of the plate 48 and plate 40 are each properly ground to provide a smooth bearing surface or, if desired, the surfaces which are in contact may be provided with hardened polished bearing surfaces.

The projection 41' on the plate 40 fits within the recess 45 and the clearance between projection 41' and the recess 45 is vrey small so that, practically speaking, vertical movement between the frame 8 and the frame 14 is inhibited. The surfaces of the bearing means 21 and 22 form a sliding fit so that relative pivotal movement can occur between the frame 8 and the frame 14 as indicated by the lines 51 and 52 in FIG. 10 of the drawings. The additional connecting means 23 consists of an enlarged ball shaped projection 54 secured to the frame 14 which is adapted to fit within a female member 55 on frame 8.

The end 41'' of projection 41' is slightly curved, as is the inner end 46'' of member 46 within recess 45, to

accommodate pivotal movement between projection 41' and member 46 on frames 8 and 14 respectively. This curvature is, as mentioned, very slight, so that it would appear as at straight line in FIG. 10.

The foregoing arrangement of the frame 8 and its relationship to the frame 14 provides a means whereby the support wheels 31 and 32 can be connected to the coach 2 to support the coach 2 as it moves along the track 3, while accommodating any necessary pivotal movement which may need to occur between the support wheels and the coach 2 as the coach goes around a curve in the track. Additionally, the arrangement of the roller members 34 and the arrangement of the roller members 35 relative to each other and relative to the wheels 31 and 32 lend additional stability to the structure and tend to inhibit rolling or swaying of the coach 2 as it moves along the track.

The track 3 is shown in end view in FIG. 4 and consists of a substantially vertically extending member 60 whose sides 61 and 62 extend divergently relative to each other from the upper end of the main body portion 60 toward the lower end thereof. Integrally formed with the inner end of the vertically extending member 60 are the laterally extending portions 63 and 64 which provide surfaces for receiving the wheels 31 and 32 on each side of the frame 14 positioned at each of the end portions 11 and 12 of the frame 8. The laterally extending portions 63 and 64 are sloped outwardly and downwardly as indicated in FIG. 4 so that any foreign objects on the the track 3 tend to move off without forming any obstructions on the tracks.

Adjacent sections of the track may be secured together as illustrated in FIGS. 3, 4 and 5 of the drawings, wherein projections 68 are provided in one section of track, which projections are adapted to be slidably received in the tubular housing 69 of the adjacent section. In order to accommodate expansion of the adjacent track sections without interrupting the laterally extending surfaces 63 and 64 of the track 3, the tongue and groove arrangement illustrated at 70 in FIG. 5 may be provided in each of the laterally extending portions 63 and 64 at the end of each track section. Thus, the track sections may contract and expand to effect relative longitudinal movement therebetween without interrupting the surface 63 and 64 upon which the wheels 31 and 32 of the coach 2 move.

An I-beam member 71 is provided at the upper end of the central upwardly extending member 60, the member 71 being provided to receive the mmebers 34 on the frame 14 above the wheels 31 and 32 as shown in dotted line in FIG. 4, which tend to eliminate swaying of the coach as it moves along the track. The roller members 34 are, as previously mentioned, mounted on each side of the frame 14 so that a set of rollers is engaged in each side of the member 71 and engage the central web 72 to roll therealong as more clearly seen in FIGS. 4 and 7 of the drawings.

The track 3 may be formed of structural steel which is welded together to form the track of the configuration illustrated in the drawings. Generally speaking, the central member 60 will be of an A configuration as shown in FIG. 8 of the drawings, the sides of the A forming the sloping surfaces 61 and 62, with the cross bar of the A being formed of a reinforcing member 73. Additional reinforcing may be provided in the track 3 by means of the bottom portion 74 which has the upwardly extending side portions 75 and 76 which engage the laterally extending portions 63 and 64 substantially adjacent the point where the load is applied from the wheels 31 and 32 as they move along the surfaces 63 and 64.

A suitable foundation as shown at 75 may be provided for the column, which columns in turn support the track 3, and the columns may be mounted upon the foundation 75 by any suitable means such as by the sleeve 76 which projects upwardly from the foundation 75 to which the column 5 may be welded, or otherwise secured.

It will be noted that the column 5 is substantially rectangular in cross-section throughout its height, and that its width at its base 77 is greater than its length, but that the width gradually tapers towards the top of the column while the length gradually increases towards the top of the column so that at the top 78 of the column, the length of the column is greater than the width. This arrangement can be more clearly seen in FIGS. 1 and 6 of the drawings. The width at the bottom of the column tends to resist any bending or turning movement of the column, while the length of the column at its top 78 provides a maximum support for the track 3 for the length of column used.

Of course, the number of columns used will depend upon the particular type of terrain, and normally the columns will be spaced anywhere from 100 to 300 feet apart. The length of the track sections will also vary and they will be anywhere from 100 to 600 feet, depending upon the particular situation and condition in which the tracks are used.

While it is believed that the structural arrangement of the support and track is apparent by reason of the foregoing, further reference is made to FIG. 1 wherein a suitable drive mechanism illustrated generally at 80 is provided for imparting rotation to one of the wheels on each side of the frame 14, adjacent the end portion 12 of the frame 8. The drive 80 is connected to the wheel by means of any suitable drive connection. The wheels upon rotation move the coach 2 along the track 3.

The interfitting relationship of the projection 41' of the plate 40 mounted on the frame 8 within the recess 45 of the member 46 of the frame 14 secures the frames 8 and 14 together so that the wheels 31 and 32 mounted on the frame 14 provide support for the coach 2 secured on the frame 8. However, relative pivotal movement between the frames 8 and 14 can occur by reason of the bearing surface 21 and 22 above described and referred to. Of course, relative vertical movement between the frames 14 and 8 is inhibited, thereby tending to prevent swaying or rolling of the coach 2 on the track 3. To further inhibit swaying or rolling of the coach 2 on the track, the rollers or wheels 34 are mounted above the wheels 31 and 32 to ride on the opposite sides of the web 72 of channel 71 so that the rolling motion of the coach 2 is maintained at a minimum. The members 35 which may be wheels similar to the wheels 31 and 32 are provided below the horizontal axis of rotation of the wheels 31 and 32, and are adapted to engage the sloping sides 61 and 62 of the track 3 so as to further aid in maintaining the rolling and swaying motion of the coach at a minimum.

The arrangement of the frame 8 at each end portion 11 and 12 and the arrangement of frame 14 within the end portions 11 and 12 enables the wheels 31 to be mounted lower relative to coach 2 than heretofore possible with prior constructions. The lowering of wheels 31 and attendant heavy support mechanism lowers the center of gravity of the coach 2, thus making it more stable and the coach has less tendency to roll and sway as it moves along track 3.

Broadly the invention relates to an elevated track and a support structure for supporting a coach thereon for movement therealong.

What is claimed is:

1. An elevated monorail track construction for accommodating the movement of a coach therealong comprising, an elongated central beam assembly having upper and lower edges, laterally extending portions formed integrally with said beam assembly adjacent the lower edge thereof, said lateral extensions having upwardly facing surfaces thereon which slope downwardly and outwardly from said beam to provide running surfaces for said coach, an I-beam member secured to said beam assembly at the

upper edge thereof to provide additional running surfaces, and means for connecting adjacent sections of track together to accommodate relative longitudinal movement therebetween, said last named means including projections in one section of track, and openings on an adjacent section of track for telescopically receiving said projections of an adjacent section.

2. A monorail transportation system comprising a monorail vehicle, opposed sets of load carrying wheels mounted on said vehicle in laterally spaced relation, the axes of said wheels being outwardly and downwardly inclined, opposed sets of side guide wheels mounted on said vehicle for rotation about essentially vertical axes, said side guide wheels being positioned above the axes of said load carrying wheels, a track construction for supporting said monorail vehicle comprising an elongated beam assembly having upper and lower edges, means adjacent the upper edge of said beam assembly providing generally vertical running surfaces for said side guide wheels, and means providing lateral extensions adjacent the lower edge of said beam assembly, the upper surfaces of said lateral extensions being sloped outwardly and downwardly away from said beam to provide inclined running surfaces for said carrying wheels said running surfaces being essentially parallel to the axes of the associated load carrying wheels.

3. A monorail transportation system comprising a monorail vehicle, opposed sets of load carrying wheels mounted on said vehicle in laterally spaced relation, the axes of said wheels being outwardly and downwardly inclined, upper and lower sets of opposed side guide wheels mounted on said vehicle for rotation about essentially vertical axes, said upper sets of side guide wheels being positioned above the axes of said load carrying wheels, and said lower sets of said side guide wheels being positioned below the axes of said load carrying wheels, a track construction comprising an elongated beam assembly having upper and lower edges, downwardly and outwardly

inclined side surface portions providing running surfaces for said lower sets of said side guide wheels, means adjacent the upper edge of said beam assembly providing generally vertical running surfaces for said upper sets of said side guide wheels, and means forming lateral extensions adjacent the lower edge of said beam assembly, the upper surfaces of said lateral extensions being sloped downwardly and outwardly away from said beam assembly to provide inclined running surfaces for said main load carrying wheels, said running surfaces being essentially parallel to the axes of the associated load carrying wheels.

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