May 5, 1925.

1,536,448

J. A. MILLER

PLEASURE RAILWAY STRUCTURE

Filed Jan. 26, 1925

2 Sheets-Sheet 1

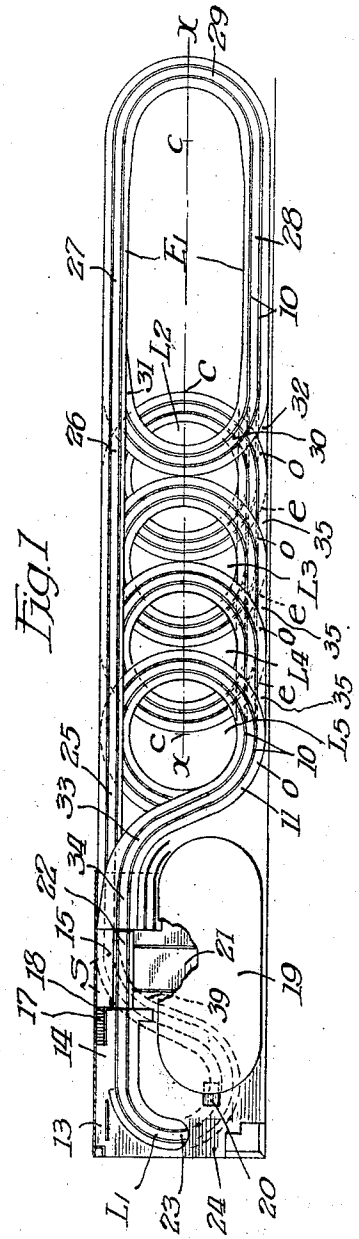

Fig. 1

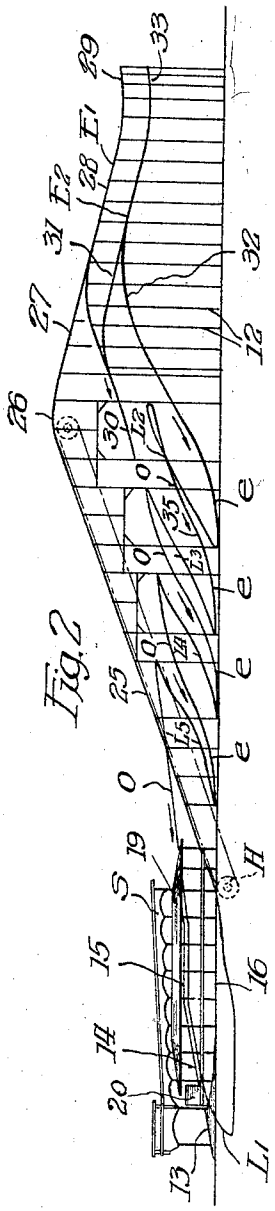

Fig. 2

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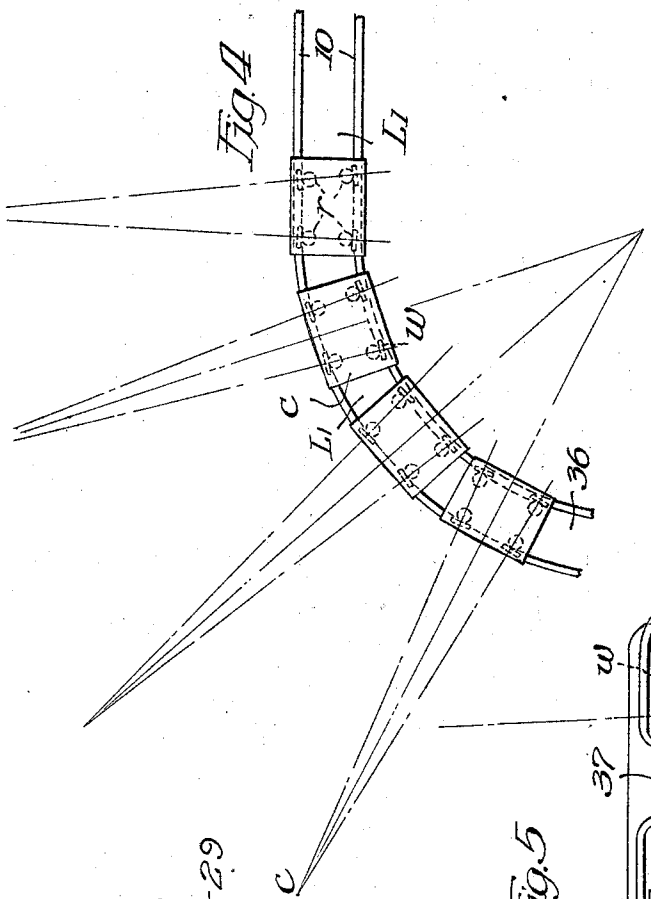

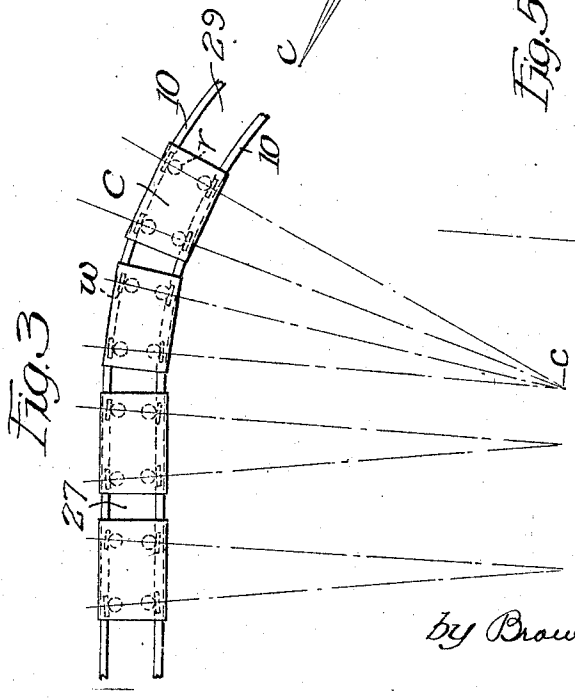

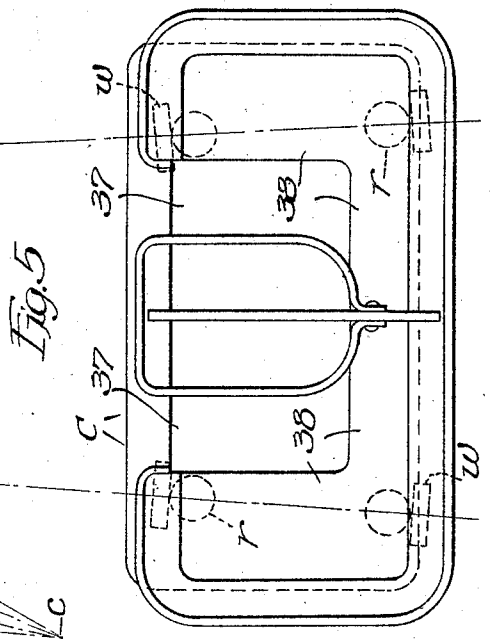

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Patented May 5, 1925. 1,536,448

UNITED STATES PATENT OFFICE.

JOHN A. MILLER, OF HOMEWOOD, ILLINOIS.

PLEASURE-RAILWAY STRUCTURE.

Application filed January 26, 1925. Serial No. 4,704.

To all whom it may concern:

Be it known that I, JOHN A. MILLER, a citizen of the United States, residing at Homewood, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pleasure-Railway Structures, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this invention.

My invention relates to pleasure railway structures and the general object is to provide improved construction, arrangement, and operation, which will greatly increase the sensation and pleasure.

In pleasure railways, the usual construction incorporates more or less steep and abrupt inclines or dips followed by more or less abrupt up grades or summits, and the rapid travel over such dips has been relied upon to give the sensation and pleasure to the patrons of the rides. In other words, the sensation was produced by the sudden changes in the vertical travel of the passenger cars, and although lateral curves have been used in pleasure railway structures, they have usually been of long radius, or when of shorter radius such curves usually followed an up grade or other slow track section so that the cars could safely take the curves. The cars generally used on these prior structures have usually four wheels whose axes are normal, that is, at right angles with the longitudinal axis of the car body. The travel of such wheel arrangement around curves, particularly short radius curves, is accompanied by considerable friction and consequently retardation in the travel of the car. In pleasure railways the cars, before starting their journey around the track, are drawn up to the top of a starting summit and are thus given a traveling potential, the cars then traveling from the starting summit by the force of gravity over a series of other summits whose altitudes successively diminish as the end of the ride is approached. In order to get the most out of the traveling potential acquired by the cars when at the top of the starting summit, the friction of travel must be reduced to a minimum and consequently in such prior structures, short lateral curves have been avoided as much as possible. Heretofore, therefore, lateral curves have not been depended upon nor utilized for sensation producing travel.

The main object of my invention is to produce a compact pleasure railway structure abounding in lateral curves or loops of short radius, and to attain such traction of the cars that they will travel with practically no friction around such curves and with great speed. I attain this by giving all the lateral speed curves the same radius and by arranging the car wheels with their axles or bearing pins in radial lines centered at the points of curvature of the turns around which the cars are traveling, this reducing the traction friction to a minimum. With such wheel arrangement, when a car travels over straightaway track sections or sections having a curvature radius different from that of the speed curves, the traction will be accompanied by more or less frictional resistance caused by the sliding or skidding to a greater or less degree of the wheels on the rails. This is the friction or retardation that I rely upon in the operation of my improved structure for permitting cars to safely enter the lateral curves at the end of a long steep incline or dip. In accordance with my invention, the entrance track sections to the speed curves are designed so that the traction friction of the cars thereover will automatically brake the cars to an extent just sufficient to permit them to safely enter upon and take the curves.

The above objects and features, together with many other features of construction and operation, will be more clearly understood from the following detail description and by reference to the accompanying drawings, in which:

Figure 1 is a more or less diagrammatic plan view of a railway structure;

Fig. 2 is a side elevational view with the track direction and curvature diagrammatically shown;

Fig. 3 is an enlarged plan view of part of one of the speed curves and adjacent straight track section, and also showing the arrangement of the car wheels and their co-operation with such track;

Fig. 4 is an enlarged plan view of a section of reverse curve track and adjacent straight track and showing the co-operation of the car wheels therewith;

Fig. 5 is a plan view of a car whose seat-

ing arrangement makes its particularly desirable for use in connection with my improved railway structure.

The track rails 10 may be supported on suitable sleeper structure 11 which is supported on trestle work 12 which may be of steel or wooden beams and strengthening members. The rail supporting structure disclosed in my co-pending application, Serial No. 755,133, filed December 11, 1924, may be advantageously used. Likewise the car structure C may be like those disclosed in this co-pending application, the safety abutments r then co-operating with the track rails to hold the cars to the rails during their rapid and sudden direction changing travel over the railway structure.

My improved structure can be accommodated on small ground space and still provide a long ride. On the drawings, the structure is shown built on a short narrow strip of land. For example, a structure arranged as shown and built on a strip of land 65 feet by 450 feet, there would be several thousand feet of track and considerable ground space left over for other concessions. The track is arranged in a plurality of loops, either circular or elongated, but with all the loops curved to the same radius length. On the drawings I show a number of circular loops designated as a whole L and a number of elongated loops designated as a whole E, the circular loops and the ends of the elongated loops being all to the same radius of curvature and with the centers of curvature all in the same vertical plane x—x, the loops extending full width of the available ground space.

At the front end of the ground strip and along one side thereof is the building structure or station S. This station has the entrance ramp or inclined entrance floor 13 leading to the loading platform or floor 14. As shown, this platform is inclined and may be a continuation of the entrance ramp 13. Adjacent to the loading platform is the unloading platform or floor space 15 which is shown as horizontal and some distance above the ground or the floor 16 of the station building S. A stairway 17 leads from the unloading platform down to the floor 16, and a railing 18 surrounds this exit stairway and also extends between the loading and unloading platforms.

Between the station S and the opposite side of the ground space, there will be ample room for a building 19 affording suitable floor space for concessions. I have shown an oblong building having the entrance 20. The building may be provided with an upper floor 21 of the same level as the unloading platform 15, so that cars may be transferred to and stored on the floor 21 by means of a suitable transfer table 22.

In the particular arrangement shown, the ride starts with a track loop L^1. This loop is in greater part circular, but is abruptly canted in order to bring it below the floor of the building 19 and to the bottom of the hoisting track section. The loop, therefore, extends in greater part through a tunnel having its entrance at 23, leaving sufficient ramp space 24 to the entrance 20 of the building 19.

The entrance loop extends to the hoist section 25 of the track structure. This section extends from the station along the edge of the ground space and terminates at the starting summit 26, cars being towed up to the starting summit by suitable chain hoisting mechanism H in a manner well understood in the pleasure railway field. Upon being released at the starting summit 26, the cars will be propelled by the force of gravity around the various curves and loops already referred to. The first elongated loop E^1 which the cars take has the sides 27 and 28 and the end curves 29 and 30. The curve 30 enters the second loop E^2 comprising the sides 31 and 32 and the end curve 33, the loop E^2 being a distance below the loop E^1. The straight side 32 of the elongated loop E^2 provides a long down grade practically to the ground and runs into the first of the series of circular loops L^2, L^3, L^4, etc. As before explained, these loops are all to the same curvature radius and extend full width of the ground space and are inclined upwardly from the ground, as clearly illustrated in Fig. 2. The entrance ends e of these various circular loops are shown below their outlet ends o, and the outlet end o of the last loop leads to the reverse curve 33 running to the horizontal track section 34 leading to the unloading platform 15. Between the outlet end of each loop and the entrance end of the next loop there is a section of straight track 35, the purpose of which will be explained later.

If the ordinary type of car with parallel axles or bearing pins were used on the track structure I have described, the traction potential given the car at the top of the starting summit would soon be dissipated in overcoming the traction friction of the car wheels at the curves, and the total track length would have to be made very short. Furthermore, with the parallel axles, straight-away sections would have to be very short in advance of the turns or the cars would have to be provided with braking outfits to retard them sufficiently so that they could safely take the curves. In the operation heretofore dips are usually followed by upgrades for checking the speed sufficiently for the next dip, and short curves are usually preceded by upgrades, so that the cars will be brought to a safe speed before entering the curves. Thus, in prior operation, the curves have been operated slowly and

without sensation, the sudden vertical dip having been depended upon for the sensational feature.

The object of my invention is to provide for frictionless, speedy, and sensational curves and for safely but sensationally taking curves at the bottom of long, straight-away inclined sections or dips of considerable altitude. All this I accomplish by setting the car wheels with their axles or bearing pins extending in radial lines centered at the centers of curvature of the elongated and circular speed loops, the radii of curvature of these loops being all of the same length, as has already been explained. With this arrangement the car wheels will always be tangential to the rails at any curve having such common radius of curvature. Then, when ball bearings are provided for the wheels, the cars can travel rapidly around the curves and loops with practically negligible friction. On the other hand, on curves of different radii, or on reverse curves, or on straight track, the wheels will not be tangential and their engagement with the rails will be accompanied by a corresponding amount of friction which automatically produces braking action. The resulting friction is particularly great at reverse curves and this insures safe travel of the cars under certain conditions to be referred to later.

My improved wheel arrangement relative to the track is shown in Figs. 3, 4 and 5. Fig. 3 shows a section of speed curve and of straight track with cars on both sections. As shown, the wheels *w* are arranged so that when the cars are on the curve the wheel axes will be in lines passing through the center of curvature *c*. When the wheels are then on the curve section, traction friction will be eliminated, while when the wheels are on the straight section the wheels will be inclined at angles with the vertical planes of the rails and there will be corresponding skidding action or friction engagement as the car travels which will cause corresponding retardation of the car.

Fig. 4 shows a chain of cars partly on a straight section and partly on the reverse curve section 36. When on the reverse curve section the wheels will be at decided angles with the rails and the traction friction will be very great. Such friction is taken advantage of on the first or entrance loop L^1, which loop is steep and suddenly dips downwardly from the loading platform to enter the tunnel 23. The loop is also of reduced radius and this, with its reverse curvature, will cause sufficient friction to permit the sudden steep dip to be safely taken, but with great pleasure and sensation to the passengers, the angularity of the car wheels relative to the rails giving the same sensation that skidding of an automobile down a steep hill would give.

As shown in Fig. 5, a preferable arrangement of the seats 38 in the cars is shown, such seating arrangements being fully disclosed in my co-pending application, Serial No. 755,134, filed December 11, 1924. As shown, the wheels on the car are arranged so that the car's entrances 37 are toward the curvature points when the car is traveling on the speed loops E and L, the passengers on the seats 38 then facing toward the inner side of the curves with the seat backs safely holding them in the car against any centrifugal action. However, on reverse curves, the passengers will face toward the outer side of the curves, this being the case on the entrance loop L^1, and on the reverse curve 33 which the cars travel just before reaching the unloading platform.

Reviewing now the operation, the passengers enter the station along the ramp 13 to the loading platform 14 from where they enter the cars which have been shifted into position from the unloading platform 15. The cars being started, they will first take the abrupt dip around the entrance loop L^1 and into and through the tunnel 23. As before stated, the loop L^1 is a reverse curve, but when the cars reach the curve 39 leading to the main hoist section 25, they will be righted, that is, with their entrance side ready to face the inner side of the curves, and in this position the cars will travel through the various loops until the reverse curve 33 is reached just in advance of the unloading platform. When the cars reach the base of the hoist section they are coupled to the hoisting chain H and towed to the summit 26 from where they start their travel of the track structure. The cars will first encounter the long downhill section 27 leading to the curve 29. On the straight section 27 the car wheels will have sufficient frictional engagement to effect enough braking action to permit the cars to safely enter the curve 29 where the wheels will be tangential to the rails, and the cars will, therefore, travel without friction and unchecked around the curve and will then take the upgrade side 28 of the loop E^1. The upgrade on this section, together with the frictional engagement of the car wheels thereon, will permit the cars to safely take the dipping curve 30 of the loop E^1. The cars will then travel down the side 31 of the loop E^2 and around the loop curve 33 and then up to the summit of the side 32 of said loop preparatory to taking the steep dip to the first circular loop L^2. The cars travel down the incline 32 practically to the ground and then up and down along the loop L^2 to the straight section 35 between the loop L^2 and the next loop L^3. The cars traveling rapidly down the loop L^2 will acquire momentum, but before reaching the curve L^3 the associated straight section 35 is traversed on which sufficient friction

will be produced to check the cars to a safe speed before taking the curve L^3. In the same manner, the straight section 35 in advance of the next curve L^4 moderates the speed sufficiently for safety. After the last loop the cars take the reverse curve 33 under heavy traction friction and the cars approach the unloading platform slowly enough to be readily stopped.

By reason of this automatic braking action on declines in advance of curves, such declines can be from high summits, thus adding to the sensation. Although cars are actually retarded by the traction friction, it is not apparent to the car passengers. To the contrary, the frictional engagement gives a sliding or skidding feeling to the passengers, and if anything, they will imagine that the car is going faster rather than being retarded. This sensation, added to the anticipation of taking a sudden turn visible at the base of the decline, makes riding in my improved ride full of thrills, sensations and pleasure. Perhaps the greatest sensation and thrill comes at the curves and loops, for instead of feeling the car retarded by the traction friction as would be expected, the occupants find themselves speeding around the curves without any apparent check of any kind.

By the compact arrangement of curves and loops shown, a long ride can be obtained in a short narrow space. The space within and below the elongated loops E can be utilized for concessional structures.

Many modifications can, of course, be made in the number, arrangement, and nature of the several curves, loops and other track sections, and in the apparatus without departing from the spirit of my invention.

I claim as follows:

1. In a pleasure railway, the combination of a track having a plurality of curves of the same radius length and track sections of other radius lengths between said curves, and cars for said tracks, the wheels of said cars being set to be tangential to the rail curvature when the cars travel over said curves and to be non-tangential when the cars travel over the other track sections.

2. In a pleasure railway, the combination of a track structure having track sections of different curvature radius, and a car having its wheels permanently set so as to be tangential to the rail curvature when traveling on some of said track sections and to be non-tangential when the car travels on other track sections.

3. In a pleasure railway, the combination of a track structure having a number of curves of the same radius and each preceded by a track section of different radius, and a car for said track structure having its wheels permanently set to be tangential with the rail curvature when the car is on said curves and to be non-tangential when the car is on said other track sections in advance of said curves.

4. In a pleasure railway, the combination with a track structure having a decline section and a lateral curve at the bottom thereof, of a car having its wheels permanently set to be non-tangential with the rail curvature when traveling down said decline but to be tangential with the rail curvature when traveling around the curves.

5. In a pleasure railway, a track structure having a plurality of lateral loops, the radii of curvature of said loops being the same, a decline track section connecting the outlet end of each loop with the inlet end of the next loop, and a car having its wheels set with their axes in the radial line of curvature when said car is traveling around said loops, said decline sections being of different curvature.

6. In a pleasure railway, a track structure comprising track sections having different radii of curvature, a car for traveling over said track structure, and means for causing the wheels of said car to be tangential with the rail curvature of some of said track sections and to be non-tangential with the rail curvature of other track sections.

7. In a pleasure railway, the combination of a track structure having a plurality of lateral curves and intervening track sections, a car for traveling over said track structure, and means for causing the car wheels to be tangential to the rails when traveling around said curves, and to be non-tangential to the rails when traveling over the intervening track sections.

8. In a pleasure railway, the combination of a track structure comprising a plurality of lateral turns having the same radius of curvature, declines approaches for said curves having radii of curvature different from that of said curves, and a car having wheels arranged to engage tangentially with the rail curvature at said turns but to engage non-tangentially at said decline approaches.

9. In a pleasure railway, the combination of a track circuit having a plurality of lateral curves, a decline entrance track section for each curve, and a car having its wheels set relative to said curves to be tangential thereto when the car travels around said curves, said approach track sections being of such lateral curvature that the wheels of said cars will be non-tangential whereby said car will be frictionally retarded before entering a curve.

10. In a pleasure railway, the combination of a track structure comprising a succession of circular lateral loops having the same radius of curvature, said loops being inclined with their exit ends forming declines, a track section of different radius of curvature intervening between the exit

end of said loop and the entrance end of the next loop, and a car for said track structure having its wheels set with their axial lines extending through the curvature centers of said loops when said car is traveling on said loops, said intervening sections having curvature radius different from that of said loops whereby the frictional engagement of the car wheels on said sections will automatically brake the car prior to entering the loops.

11. In a pleasure railway, a track structure having a plurality of lateral speed curves and connecting track sections, and a car having its wheels arranged to take said speed curves without traction friction, but to have more or less frictional traction engagement with the rails of said connecting track section.

12. In a pleasure railway, the combination of a track structure having a row of inclined speed loops and intervening straight track sections, and a car having its wheels set with their axes convergent to the curvature centers of said curves when said car travels said loops whereby to eliminate traction friction, said wheels having sufficient frictional traction engagement with the rails of said straight track sections to brake the speed of the car to a safe limit before entrance of the car on speed loops.

13. In a pleasure railway, the combination of a track structure comprising a series of circular inclined loops having the same length radius of curvature, the outlet end of each loop being above its inlet, a section of track connecting the outlet end of each loop with the inlet end of the next loop, and a car having its wheels set with their axes converging to the curvature center of the loop on which the car is traveling, the track sections connecting said loops being of different curvature whereby the resulting traction friction will brake the cars before entrance thereof to said loops.

14. In a pleasure railway, a lateral curve, a steep decline leading thereto, a car having its wheels set at angles to take said curve tangentially, the lateral curvature of said decline being such that said wheels will have frictional traction engagement therewith whereby to retard the car before entrance thereof on said curve.

In witness whereof, I hereunto subscribe my name this 22nd day of January, 1925.

JOHN A. MILLER.