(No Model.) 4 Sheets—Sheet 1.

H. BORMANN.

SINUOUS PLEASURE RAILWAY.

No. 434,554. Patented Aug. 19, 1890.

Fig. 1.

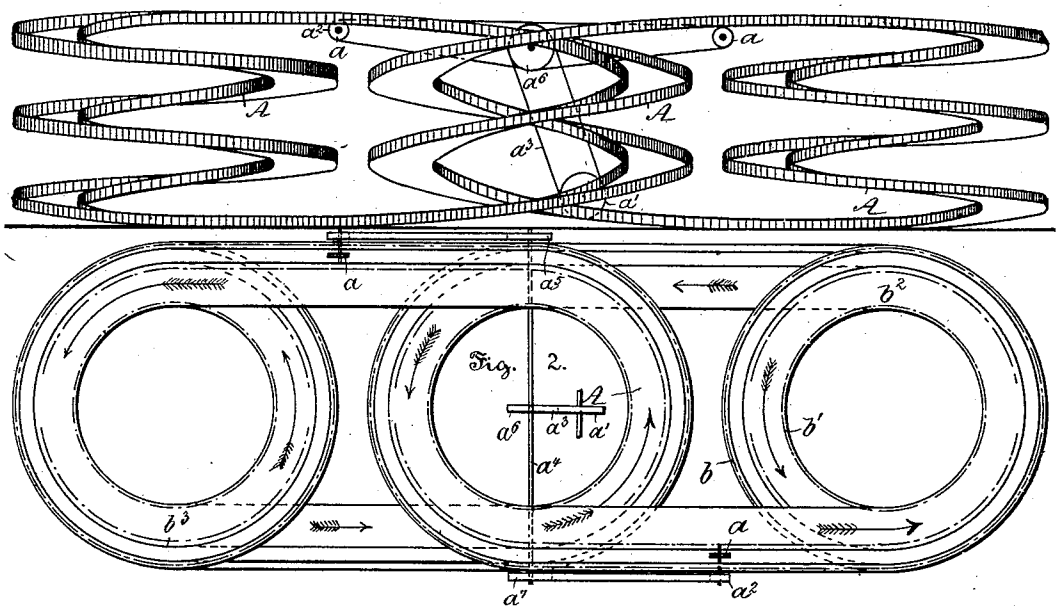
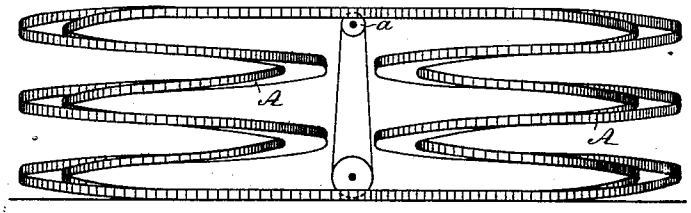
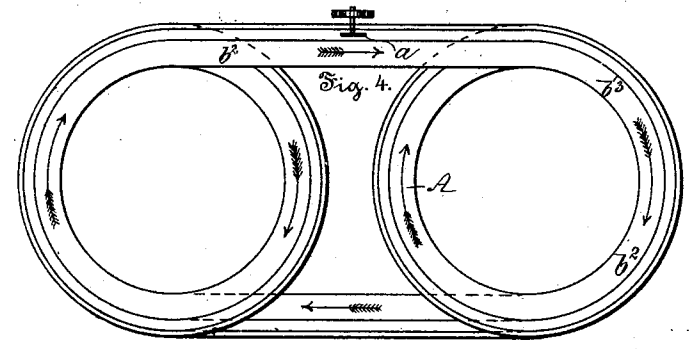


Fig. 3.





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SINUOUS PLEASURE RAILWAY.

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Fig. 5.

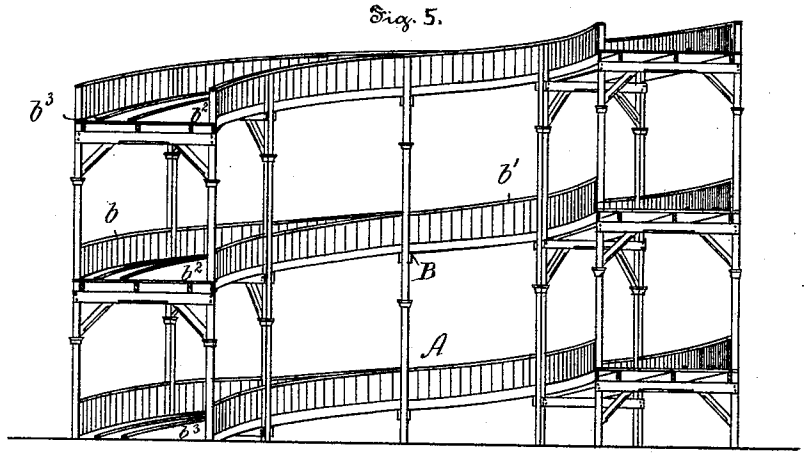


Fig. 6.

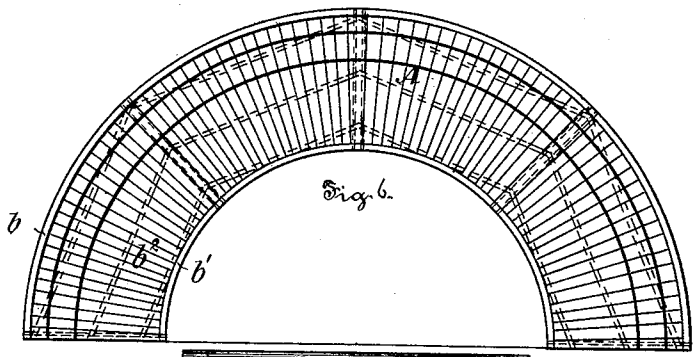


Fig. 7.

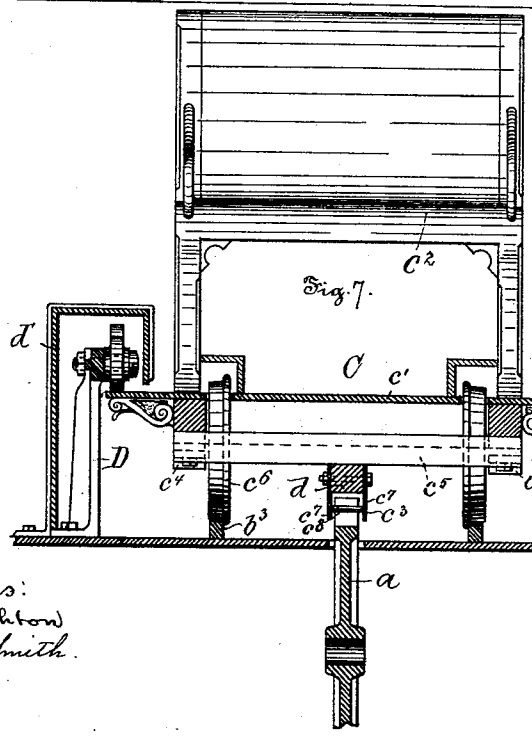
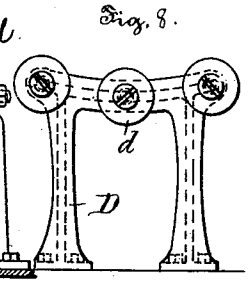


Fig. 8.



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4 Sheets—Sheet 3.

H. BORMANN.

SINUOUS PLEASURE RAILWAY.

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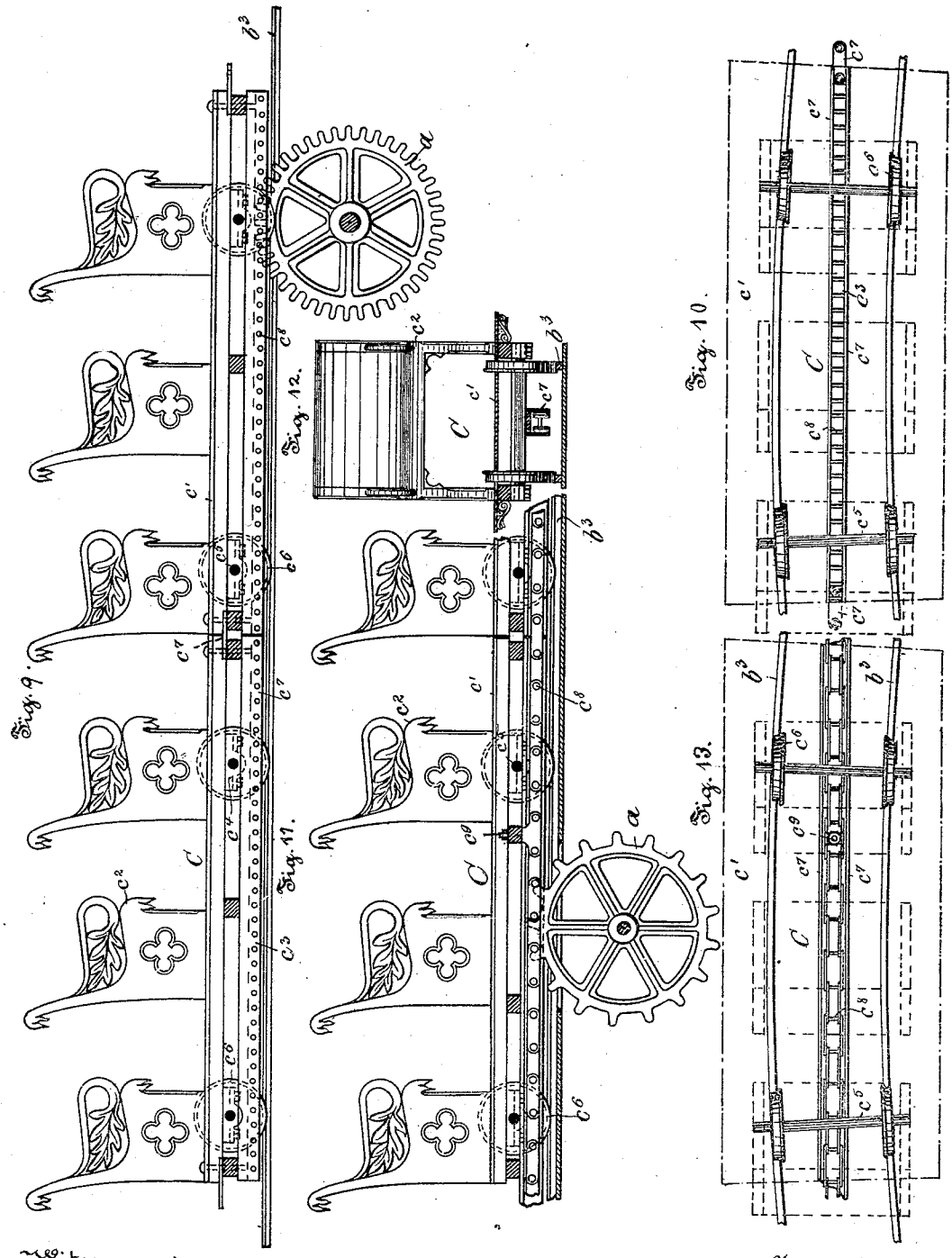

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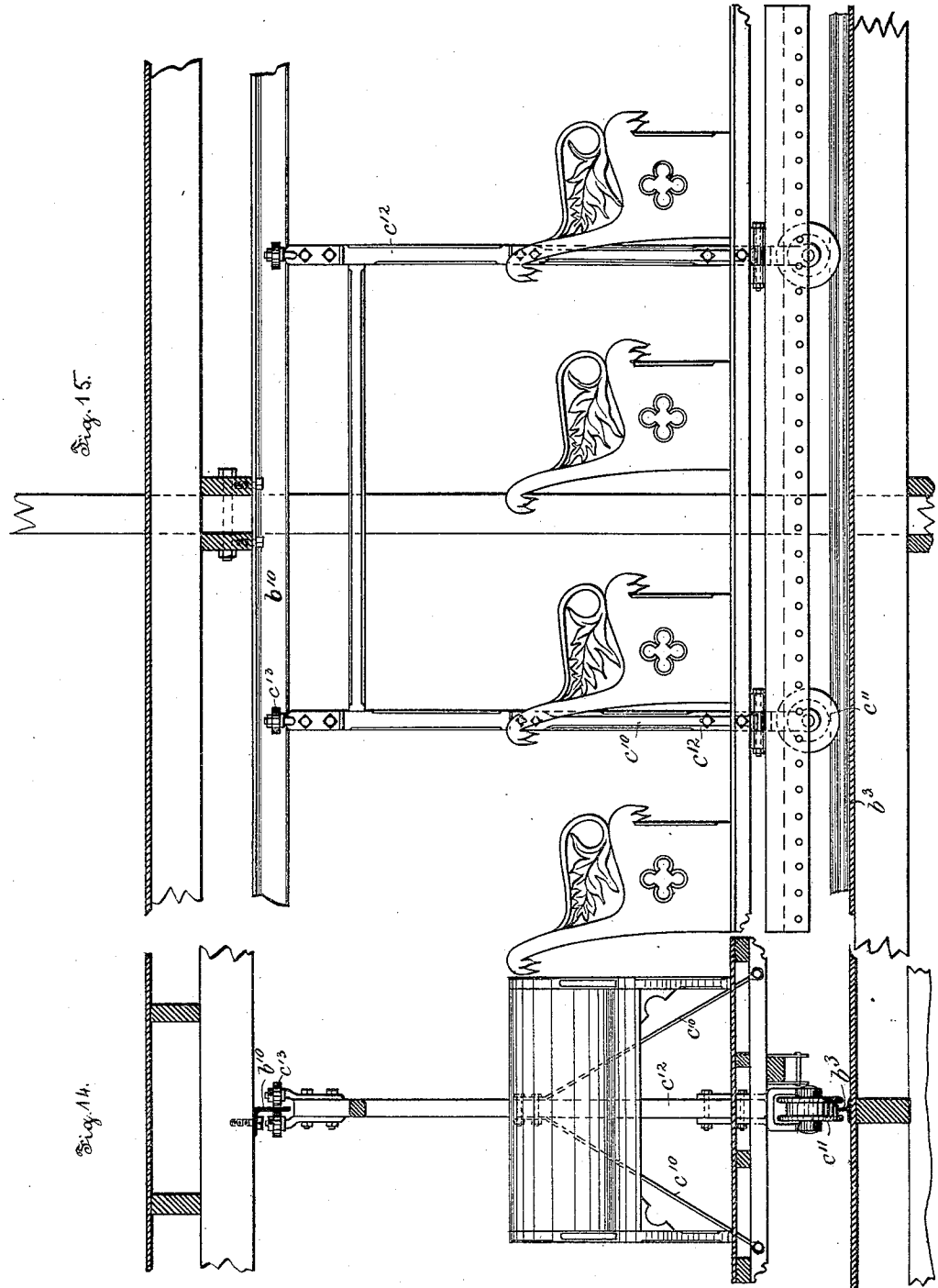

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UNITED STATES PATENT OFFICE.

HERMANN BORMANN, OF PHILADELPHIA, PENNSYLVANIA.

SINUOUS PLEASURE-RAILWAY.

SPECIFICATION forming part of Letters Patent No. 434,554, dated August 19, 1890.

Application filed November 13, 1889. Serial No. 330,175. (No model.)

To all whom it may concern:

Be it known that I, HERMANN BORMANN, a subject of the Emperor of Germany, but now residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sinuous Pleasure-Railways, of which the following is a specification.

My invention relates to an improved sinuous or undulating pleasure-railway adapted for cars or coaches to traverse with an easy gliding movement.

The principal objects of my invention are, first, to afford the patrons of such a pleasure-railway the excitement of a merry-go-round and the exhilaration of a sliding hill; second, to reduce the amount of space occupied by such a structure and to afford a longer and more varied ride from the starting-point over the course to the starting-point again than has heretofore been obtained in pleasure-railways; third, to provide simple and durable traction mechanism for propelling the cars and coaches over the course with a gliding movement and without shock or jar; fourth, to provide mechanism whereby slipping and binding of the wheels of the cars and coaches in their passage over the tracks of the sinuous or undulating course are entirely obviated, and, fifth, to prevent the wheels of the cars and coaches from leaving the tracks and to avoid breaking down of the propelling mechanism.

My invention in general consists of two or more spiral courses arranged to permit of cars or coaches being propelled in upward directions over and around two intertwined spirals winding in the same direction around a common vertical axis, and permitted then to descend over and around end spirals combined therewith, or the cars or coaches elevated by power over and around one of two similarly-disposed spirals and to descend then over and around the opposite spiral.

My invention further consists of the general construction and arrangement of the rails, the wheels of the cars or coaches which run upon said rails, and of the safety or guard rolls to prevent the cars or coaches from leaving the tracks.

The nature and characteristic features of my invention will be more particularly understood, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is an elevation of a continuous course formed with two end spiral courses with two middle intertwined spirals winding in the same direction around a common vertical axis, and also the means for transmitting motion to the cars or coaches for their propulsion over the course. Fig. 2 is a top or plan view of the same, showing the tracks or rails of the course and in dotted lines the railings to protect persons promenading over the same. Fig. 3 is an elevation of the continuous course formed of two similarly-disposed spirals, and also the means for propelling the cars or coaches over and around one of said spirals of the course. Fig. 4 is a top or plan view thereof. Fig. 5 is a transverse sectional view of the superstructure, showing one portion of the spirals of the course with the columns and beams or rafters for supporting the structure over which the cars or coaches are propelled and permitted to traverse the courses. Fig. 6 is a top or plan view thereof. Fig. 7 is a view, partly in end elevation and partly in section, of a car mounted on wheels and provided on the under side thereof with a rack, and showing, also, the rails of the course and the safety or guard rolls having a hood surrounding the upper portion thereof, and a pinion or spur wheel meshing with said rack. Fig. 8 is a side elevation of the safety or guard rolls. Fig. 9 is a side elevation of two cars or coaches coupled together and provided on the under side thereof with a rack adapted to permit of a spur-wheel meshing therewith. Fig. 10 is a plan view of the under side of a car or coach with the axles and ends thereof disposed at an angle to each other, and also showing the rack with which meshes the spur-wheel or pinion. Fig. 11 is an elevation of a portion of two cars, showing another form of rack and the manner of securing the same to the cars or coaches. Fig. 12 is an end view showing the manner of supporting the rack to the cars or coaches. Fig. 13 is a plan view of the under side of the car or coach shown in

Fig. 11, with a chain or link form of rack for the spur-wheel to engage with for propelling the cars or coaches. Fig. 14 is an end view, partly in section and partly in elevation, of a modified form of car traveling upon one track and supported in a vertical position by guide-rolls engaging with a depending beam or rail; and Fig. 15 is an elevation of a car or coach, showing the central frame-work for carrying the guide-rolls.

Referring to the drawings, A is the spiral or sinuous course. This course may be supported upon trestle or frame work resting upon the ground, or it may be secured to the sides or walls and roof of a building. The number and arrangement of the spirals constituting the course depend upon the amount of space available for the purpose. The arrangement and construction of the similarly-disposed end spirals having combined therewith two intertwined spirals winding in the same direction around a common vertical axis (shown in Figs. 1 and 2) are for structures where ample space is available for such railway-courses. The similarly-disposed end spirals having combined therewith the two intertwined middle spirals winding in the same direction around a common vertical axis, and the similarly-disposed spiral courses of Figs. 3 and 4, afford not only a long course, but also an exceedingly compact structure for such pleasure-railroads.

It may be remarked that in actual operation the sensation of ascending one spiral and descending another spiral or spirals in the reverse or in a similar manner is very popular. Moreover, the cars winding around and up and down the spirals of the course present a pleasant and amusing spectacle to those watching the sport, and the excitement of the sport is greatly enhanced by providing short undulations in the course; but I prefer to make the ascending and descending curves of the course comparatively smooth and gradual.

One or more spur-wheels or pinions a is or are located at a convenient point or points in the course, preferably at the summit, and revolve in suitable bearings secured to the frame-work.

a^2 is a pulley adapted to impart motion to the spur-wheels or pinions.

a' is a pulley keyed to a shaft driven by a steam-engine or other source of motion. (Not shown.)

a^3 is a belt adapted to transfer motion from one pulley to another, and a^4, Figs. 1 and 2, is a counter-shaft provided with three tight pulleys a^5, a^6, and a^7.

B, Figs. 5 and 6, is the frame or trestle work, consisting of columns, rafters, and beams for supporting the structure or railway-course.

b and b' are railings arranged around the edges of the course for separating the promenaders from the riders.

b^2 is a footway for the accommodation of persons either waiting for an opportunity to ride or watching the participants in the sport as they pass around the course or courses.

Referring now especially to Figs. 2, 4, 5, 6, 7, 9, 10, 11, and 13, b^3 are the rails laid upon the course in any preferred manner and in two parallel rows extending entirely over the course or courses. The cars or coaches G travel over the rails b^3 of the entire course A. Each car G is provided with a main platform c', having the extremities thereof cut away, as shown in dotted lines in Figs. 10 and 13, to permit a train composed of such cars or coaches coupled together to be propelled over and to traverse the curved portions of the course. The sides of the platforms c' extend laterally beyond the rails b^3, for a purpose to be presently described. The seats c^2, for the accommodation of the passengers, are secured to the platforms c' in any preferred manner, and preferably arranged transversely to each car or coach. A rack c^3 is secured to the under side of each car or coach and journal-boxes c^4 to the under side of the platforms. These journal-boxes c^4 are arranged radially with reference to the center of the spiral of the course and support the axles c^5. The wheels c^6, adapted to run on the rails b^3, are carried by the axles c^5, and may be keyed or otherwise secured thereto; but I prefer to mount one of the wheels loosely upon the axle c^5, in order to avoid their binding or slipping on the tracks in the passage of the cars or coaches over the short straight portions of the courses. The radial position of the axles prevents the wheels from binding upon the rails when the cars are traversing the curved or spiral portions of the courses.

The draw-heads or links c^7 for coupling the cars or coaches together are secured to respective extremities of the cars in any preferred manner.

The rack c^3 consists of a strip d of wood secured to the under side of each car or coach, and to which a depending metal strip c^7 is bolted to each side thereof. The teeth of the rack may consist of the transverse bolts or stays c^8, secured at the respective ends thereof to the metal strips c^7, as shown in Figs. 9, 10, 14, and 15. A modified form of rack is illustrated in Figs. 11, 12, and 13, in which the ends of the depending strips c^7 are flanged, by preference inwardly, in order to furnish a support for an endless chain composed of long links, and the connecting-bolts c^8 of which form the teeth of this rack. This chain is secured to the under side of the platforms of the cars by one or more links provided with projections which terminate in bolts c^9, whereby the car C is held in the manner illustrated, for instance, in Figs. 11, 12, and 13.

Referring now to Figs. 14 and 15 for a description of another form of my invention in which the rail b^3 in a continuous line is laid

upon the course in a single sinuous direction, and the angle-iron or depending rail b^{10} is secured to the frame-work of the superstructure vertically above the single rail b^3, the wheels c^{11} revolve in bearings secured to the lower portion of the frame c^{12}, and are adapted to traverse the continuous single line of rails b^3. The similarly-disposed rolls c^{13} run in bearings located on each side of the depending rail b^{10}. These rolls are secured to the upper portion of the central frame c^{12} and embrace the depending rail b^{10} and thereby maintain the frame c^{12} in a vertical position. This central frame c^{12} is free to traverse the entire course by means of the wheels thereof without binding or slipping upon said rails b^3. The platform of each car or coach C is secured to the vertical frame c^{12} and is held rigidly by means of the braces c^{10}.

The supports D, secured to the superstructure, are located adjacent to and on both sides of the spur-wheel a. The safety or guard rolls d are journaled to said supports and engage with the lateral extensions of the platforms in order to overcome the tendency of the spur-wheel a to lift the cars from the track, and also any tendency of the teeth of the spur-wheel to fail to engage with the teeth of the rack c^3. The hoods d' are either secured to the supports D or to the floor of the supersturucture and surround the upper portion of the rolls d in order to protect the passengers riding upon the cars or coaches from injury. Moreover, the lateral extensions of the platforms serve as footways for a guard or conductor to walk along to collect fares from the passengers desiring to ride over the course.

The mode of operation of the pleasure-railway heretofore described is as follows: The cars C are coupled together by means of the draw-heads or links c^7, or by means of the chain-rack, as illustrated in Figs. 11 and 13, and form a continuous train extending over the entire course. The chain c^3, secured to the under side of the respective cars or coaches, forming thereby an endless rack, is arranged so as to admit a spur-wheel a, revolved by suitable motive power, to mesh therewith. The steam-engine or other prime mover is started by the attendant in charge, and motion is transmitted to the spur-wheel a by means of the belts a^3 or in any other preferred manner. The rotation of the spur-wheel engaging with the rack propels the latter onward and causes the entire train of cars to traverse the sinuous spiral courses—for example, in the direction of the arrows—with a smooth and gliding motion. The train of cars may be stopped to take on or let off passengers either by stopping the prime mover or by shifting the driving-belt onto an idle-pulley.

It will be obvious that by providing a motor-car a number of the passenger-coaches may be drawn upward to the summit of one of the courses from the starting-point and be then permitted to return again to the starting point or points by gravity. In such an instance the spur-wheel and the rack provided underneath the cars or coaches could be omitted.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein-described sinuous pleasure-railway, consisting of two intertwined spirals winding in the same direction around a common vertical axis and connected with end spiral courses and adapted to permit of cars or coaches being propelled upward over the same and then caused to descend over the course, substantially as and for the purposes set forth.

2. The herein-described sinuous pleasure-railway, consisting of two intertwined spiral courses winding in the same direction around a vertical axis, and having connected therewith end spirals adapted to permit of cars or coaches traveling and being elevated over the courses, and of being allowed to then descend to the point or points of beginning, substantially as and for the purposes set forth.

3. The combination, with a sinuous pleasure-railway consisting of two adjacent spiral courses compassing two or more entire cycles around their centers, and rails mounted thereon, of cars or coaches provided with a rack, a spur-wheel or pinion meshing therewith, and means for imparting motion thereto, substantially as and for the purposes set forth.

4. The combination, with a sinuous pleasure-railway consisting of two spiral courses disposed adjacent to one another and compassing two or more entire cycles around their respective centers, of cars or coaches provided with devices for permitting of their elevation over one of said spiral courses and adapted to permit of the descent of the cars or coaches over the other of said courses, substantially as and for the purposes set forth.

5. The combination, with a sinuous pleasure-railway, as described, and provided with rails, of cars or coaches provided with a rack, trucks and wheels adapted to travel over said rails, guard-rolls engaging with said cars or coaches, a spur-wheel meshing with said rack, and means for imparting motion thereto, substantially as and for the purposes set forth.

6. The combination, with a sinuous pleasure-railway provided with rails and guard-rolls, of cars or coaches provided with a rack, a pinion, and means for actuating the same, substantially as and for the purposes set forth.

7. The combination, with a sinuous pleasure-railway composed of two intertwined and end spiral courses provided with top and bottom rails, of cars or coaches provided with wheels engaging with said rails, and means for propelling said cars or coaches, substantially as and for the purposes set forth.

8. The combination, with a sinuous pleas-

ure-railway, as described, of cars or coaches provided with a rack, and trucks provided with wheels adapted to travel over said railway, a spur-wheel, means for actuating the same, and guard-rolls contacting with the platforms of said cars or coaches, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

HERMANN BORMANN.

Witnesses:
THOMAS M. SMITH,
GEO. W. REED.