

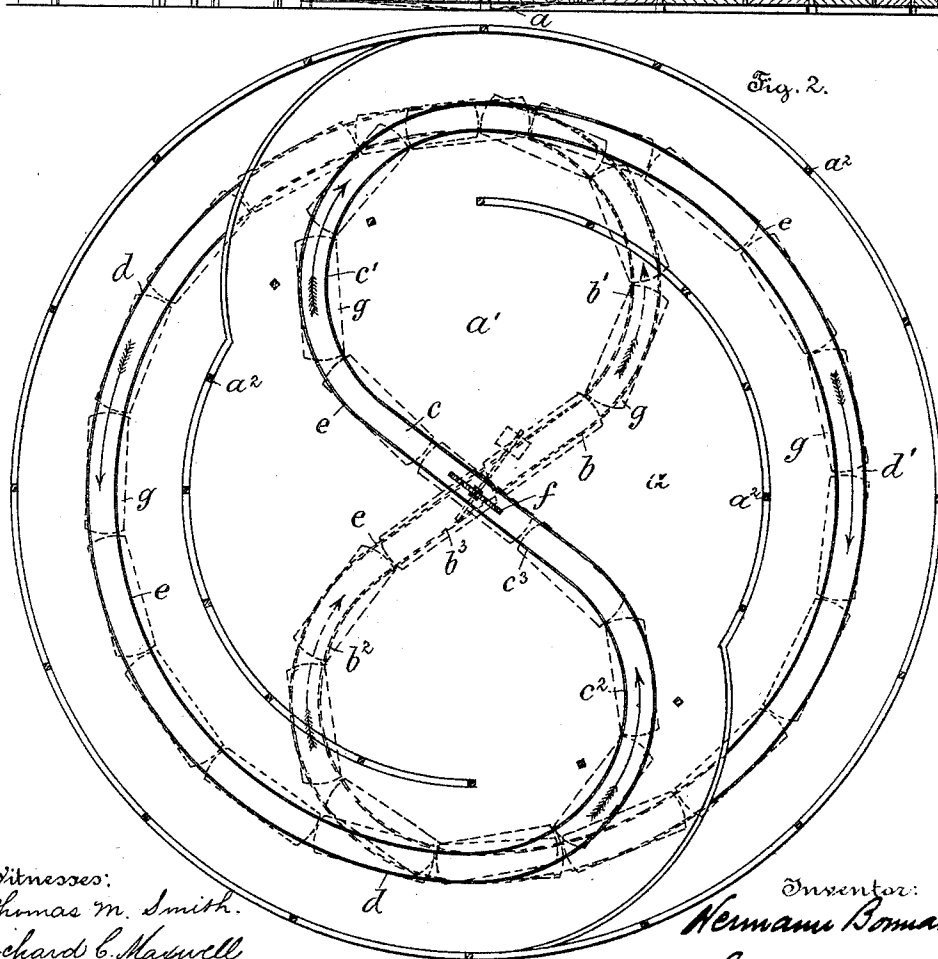
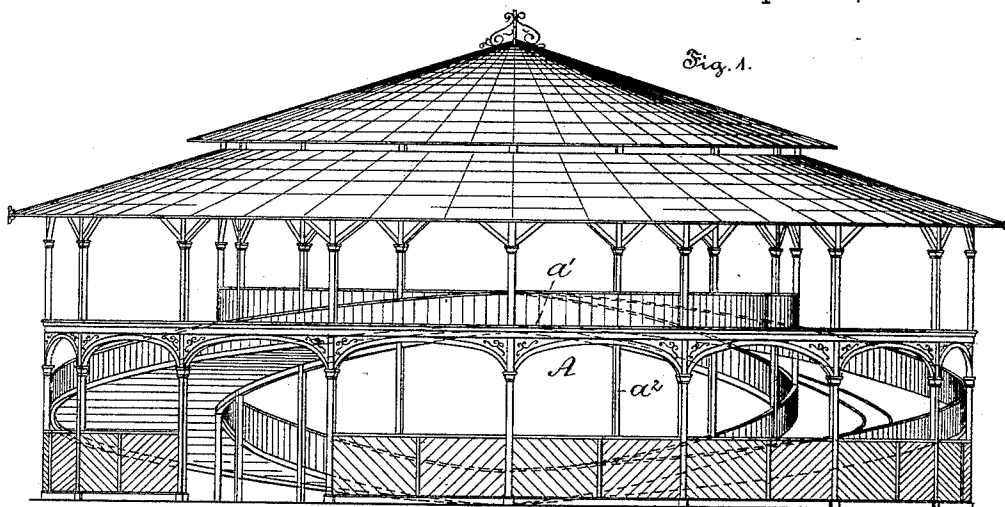
(No Model.)

2 Sheets—Sheet 1.

H. BORMANN.  
SINUOUS PLEASURE RAILWAY.

No. 450,660.

Patented Apr. 21, 1891.



Witnesses:  
Thomas M. Smith.  
Richard C. Maxwell.

Inventor:  
Hermann Bormann,  
by J. Walter Douglas.  
att'y.

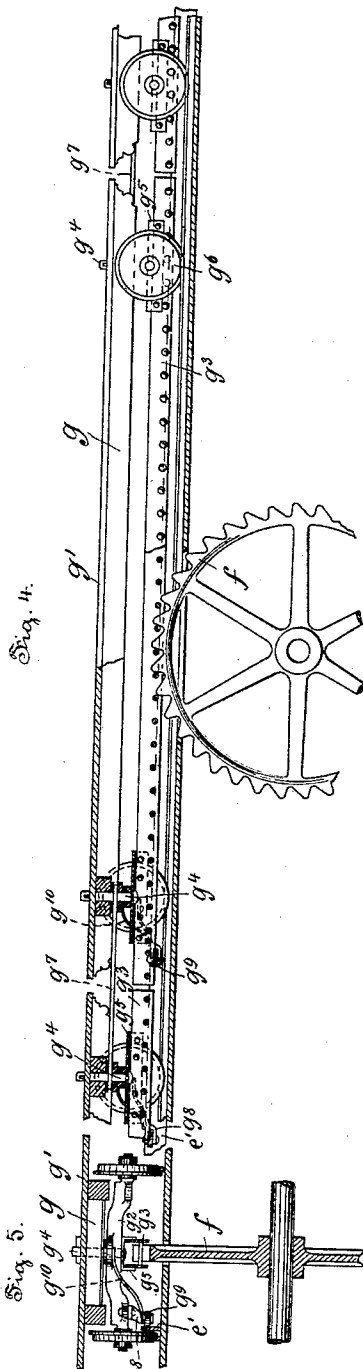
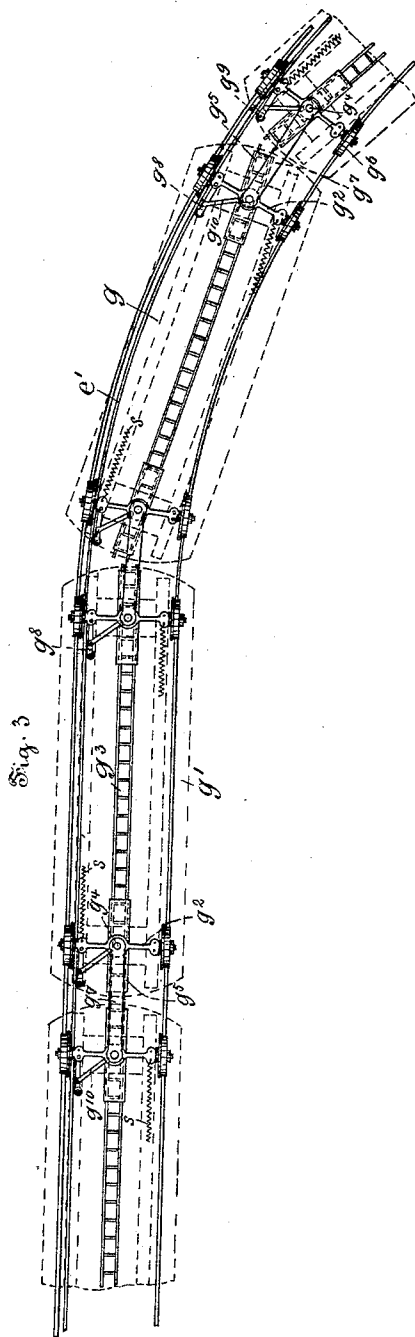
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# UNITED STATES PATENT OFFICE.

HERMANN BORMANN, OF PHILADELPHIA, PENNSYLVANIA.

## SINUOUS PLEASURE-RAILWAY.

SPECIFICATION forming part of Letters Patent No. 450,660, dated April 21, 1891.

Application filed September 22, 1890. Serial No. 365,742. (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 improved pleasure-railways, and more especially to the arrangement and disposition of the courses over which a train of passenger coaches or cars is propelled by means of a stationary engine or other prime mover with an easy gliding movement.

The principal objects of my present invention are, first, to provide a compact and comparatively inexpensive pleasure-railway structure adapted to permit of the propulsion or actuation of an endless train of cars or coaches extending over the entire course, and, second, to afford a longer and more diversified ride from the starting-point over the courses to the starting-point again than has heretofore been obtained in pleasure-railway courses or structures adapted for a solid or continuous train of cars or coaches being propelled or allowed to travel over with the occupancy of an equal amount of space.

My invention consists of a pleasure-railway comprising a substantially S-shaped course located at or near the ground, a second substantially S-shaped course located above and inversely disposed with relation to the first course, and two inclined semicircular courses connected, respectively, with opposite extremities of the S-shaped courses.

My invention further consists in the construction and arrangement of the parts of a pleasure-railway course and of cars or coaches with the particular actuating mechanism thereof, hereinafter described, and pointed out in the claims.

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

Figure 1 is an elevation of a pleasure-railway structure embodying features of my invention, and showing two inclined semicircular courses connecting upper and lower horizontal courses. Fig. 2 is a top or plan view of

Fig. 1, showing in full lines an upper S-shaped course and two inclined semicircular courses, and also in dotted lines an inversely-disposed S-shaped course located at or near the ground. Fig. 3 is a top or plan view of two connected cars or coaches and portions of two other cars or coaches, each provided underneath with a rack, and also showing mechanism for shifting and directing the trucks and the position of the racks when the cars are traversing straight and curved portions of the courses. Fig. 4 is a side elevation, partly in section, of a car or coach and of portions of two other cars or coaches provided on the under side with racks, said cars or coaches coupled together by means of links engaging with the respective king-bolts thereof, and showing also a positively-driven spur wheel or pinion engaging said racks; and Fig. 5 is an end elevation, partly in section, of a car or coach mounted on trucks, showing a guide-rail disposed parallel to the rails of the course and a roller attached to an arm secured to the truck and engaging said guide-rail.

In the drawings, A is a pavilion provided with a platform *a*, located near the ground, and with a platform *a'*, supported by posts or columns *a<sup>2</sup>* and located above the platform *a*.

*b* is an S-shaped course supported by and laid upon the platform *a*, and having the two loops *b<sup>1</sup>* and *b<sup>2</sup>* thereof connected by a straight portion *b<sup>3</sup>*, for a purpose to be presently described.

*c* is an inversely-disposed S-shaped course supported upon the platform *a'*, and having the two loops *c<sup>1</sup>* and *c<sup>2</sup>* thereof connected by a straight portion *c<sup>3</sup>*.

*d* is an inclined semicircular course connecting one extremity *b<sup>1</sup>* of the course *b* with the opposite extremity *c<sup>2</sup>* of the course *c*, and disposed in the drawings outside of and around the left side of the platforms *a* and *a'*.

Referring now to the right-hand portion of Figs. 1 and 2, *d'* is a similar inclined semicircular course connecting one extremity *b<sup>2</sup>* of the course *b* with the opposite extremity *c<sup>1</sup>* of the course *c* and located outside of and around the platforms *a* and *a'*.

*e* are rails or tracks of any preferred construction secured in the usual or in any preferred manner to the respective courses of

the structure and adapted to engage with the wheels of the cars or coaches.

The hereinabove-described course may be employed in connection with cars or coaches which are drawn separately over the ascending portions of the course by means of a cable or in any preferred manner, and then permitted to descend by gravity over the descending portions of the course to the starting-point; but preference is given to the employment of a number of cars or coaches coupled together, so as to form a solid train extending over the entire course.

When a solid train of cars or coaches is employed, it is of course necessary to propel them over and around the course, and this result may be accomplished in various well known ways; but preference is given to the employment of cars or coaches provided on the under side thereof with racks engaging with a spur wheel or pinion  $f$ , driven through suitable connections by a stationary engine or other prime mover (not shown) and located between the rails  $e$ .

It may be remarked that good results have been attained by placing the spur-wheel  $f$  at the center of the straight portions  $c^3$  of the course  $c$ , because the teeth of the pinion  $f$  are more certain to engage properly with the racks secured to the under side of the cars or coaches when the latter are traversing a straight course than they are when the cars or coaches are traversing a curved course.

If for any reason it should become necessary or desirable to employ two spur-wheels instead of one, this result may be conveniently attained by locating one of them at each of the straight courses  $c^3$  and  $b^3$  and connecting them together by suitable mechanism.

The respective loops of the S-shaped courses may, if preferred, be joined by curved instead of straight courses. In such case the spur-wheel  $f$  is located upon one of the circular portions of the course, and the racks  $g^3$  are bent into conformity with the curvature of the portions of the course adjacent to the spur-wheel, in order to insure the proper engagement of the rack therewith.

In Figs. 3, 4, and 5 each car  $g$  is provided with a main platform  $g'$ , having the extremities cut away, as shown in Fig. 3, or in any other preferred manner, in order 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.

Seats for the accommodation of the passengers may be arranged upon and secured to the platforms  $g'$  in any preferred manner.

$g^3$  is a rack having re-enforce plates  $g^5$ , provided with king-bolts  $g^4$ , riveted at or near the respective extremities thereof.

$g^2$  are trucks provided with wheels  $g^6$  and pivotally attached to the under side of the platforms  $g'$  by means of the king-bolts  $g^4$ .

$g^7$  are draw heads or links secured at the respective extremities thereof to the king-

bolts  $g^4$  for coupling the cars or coaches together.

$g^8$  are arms attached to each of the trucks  $g^2$  and provided with rollers  $g^9$ , adapted to engage with one of the rails  $e$  or with a guide-rail  $e'$  laid parallel thereto, in order to turn the trucks  $g^2$  and permit the cars to traverse the course with an easy gliding motion or movement.

$s$  are spiral springs attached at the respective extremities thereof to the trucks  $g^2$  and to the platforms  $g'$ , in order to insure the proper engagement of the roller  $g^9$  with the guide-rail  $e'$ .

$g^{10}$  are braces attached at the respective extremities thereof to the trucks  $g^2$  and arms  $g^8$ , in order to retain the latter rigidly to place.

The mode of operation of the pleasure-railway hereinbefore described is as follows: The cars or coaches  $g$  are coupled together by means of the drawheads or links  $g^7$  and form a continuous train extending over the entire course, and the racks  $g^3$  form a continuous rack attached to the under side of the train and arranged so as to permit the spur-wheel  $f$  to mesh therewith. A steam-engine or other prime mover is started by the attendant in charge, and motion is transmitted to the spur-wheel  $f$  by means of belts, or in any preferred manner. The rotation of the spur-wheel engaging the racks propels the latter onward and causes the entire train of cars or coaches to traverse the course—for example, in the direction indicated by the arrows in Fig. 2—with a smooth and gliding movement or 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, or in any other convenient or preferred manner.

It will be obvious to those skilled in the art to which my invention appertains that modifications may be made as to minor details without departing from the spirit of the invention.

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, comprising two courses, one superposed upon the other, and two inclined courses connected, respectively, with opposite extremities of the upper and lower courses and adapted to permit of cars or coaches being caused to ascend and descend over the same, substantially as and for the purposes set forth.

2. The herein-described sinuous pleasure-railway, comprising two substantially horizontal and inversely-disposed courses, and two inclined semicircular courses respectively connecting opposite extremities of the inversely-disposed courses and adapted to permit of cars or coaches being propelled and to descend over the same, substantially as and for the purposes set forth.

3. The herein-described sinuous pleasure-railway, comprising two substantially horizontal and inversely-disposed **S**-shaped courses located one above the other, and two inclined semicircular courses respectively connecting opposite extremities of the **S**-shaped courses and adapted to permit of cars or coaches being propelled and to descend over the same, substantially as and for the purposes set forth.

4. The herein-described sinuous pleasure-railway, consisting of a substantially **S**-shaped horizontal course located at or near the ground, a second substantially **S**-shaped horizontal course located above and inversely disposed with relation to the first course, and two inclined semicircular courses respectively connecting one extremity of the first **S**-shaped course with the opposite extremity of the second **S**-shaped course and adapted to permit of cars or coaches being propelled upward over the course and to then descend over the same, substantially as and for the purposes set forth.

5. The herein-described sinuous pleasure-railway, consisting of a pavilion provided with upper and lower platforms, an **S**-shaped course located on the upper platform, a second **S**-shaped course located on said lower platform and inversely disposed with relation to the first course, and two inclined semicircular courses respectively and tangentially connecting one extremity of the first **S**-shaped course with the opposite extremity of the second **S**-shaped course and adapted to permit of cars or coaches being propelled and to descend over the same, substantially as and for the purposes set forth.

6. The herein-described sinuous pleasure-railway, consisting of an **S**-shaped course having a straight portion connecting the loops thereof, a second **S**-shaped course located above and inversely disposed with relation to the first course, and two inclined semicircular courses respectively connecting one extremity of the first **S**-shaped course with the

opposite extremity of the second **S**-shaped course and adapted to permit of cars or coaches being propelled upward over the course and to then descend over the same, substantially as and for the purposes set forth.

7. The combination, with a sinuous pleasure-railway, consisting of an **S**-shaped course located near the ground and having a straight portion connecting the loops thereof, a second **S**-shaped course located above and inversely disposed with relation to the first course, and two inclined semicircular courses respectively connecting one extremity of the first **S**-shaped course with the opposite extremity of the second **S**-shaped course, of cars or coaches provided with a rack, a spur-wheel located at the straight portion of said course and meshing with said rack, and means for imparting motion to said spur-wheel, substantially as and for the purposes set forth.

8. The combination, with a sinuous pleasure-railway, as described, provided with rails, of cars or coaches provided with a rack and with spring-actuated swivel-trucks, an arm attached to said trucks and provided with a roller engaging one of said rails, a spur-wheel meshing with said rack, and means for imparting motion thereto, substantially as and for the purposes set forth.

9. The combination, with a sinuous pleasure-railway, as described, of a series of cars or coaches provided on the under sides thereof with racks, trucks attached to said cars by king-bolts, links attached to the adjacent king-bolts of said cars and interposed between said cars and rack, a spur wheel or pinion, and means for imparting motion thereto, 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,  
RICHARD C. MAXWELL.