Oct. 7, 1947. N. BARTLETT 2,428,607

AMUSEMENT RIDE

Filed July 13, 1944 5 Sheets-Sheet 1

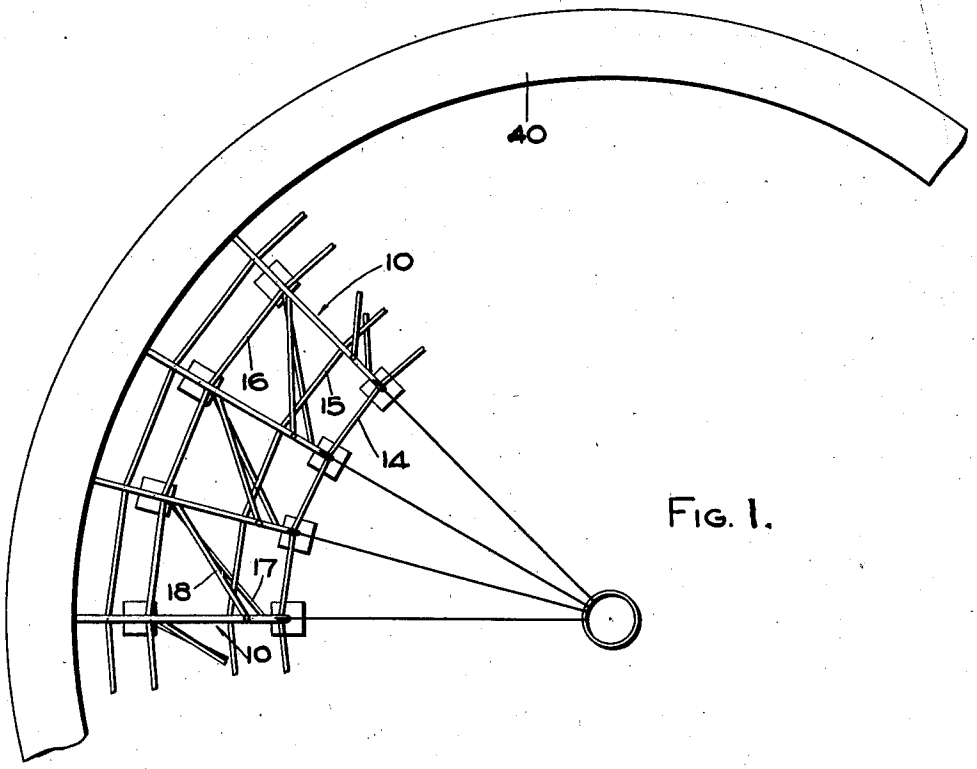

FIG. 1.

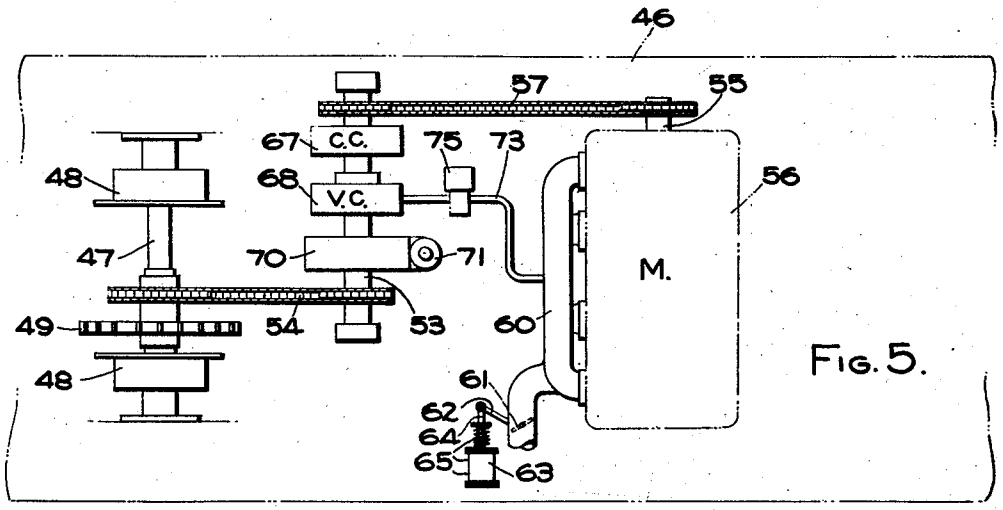

FIG. 5.

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AMUSEMENT RIDE

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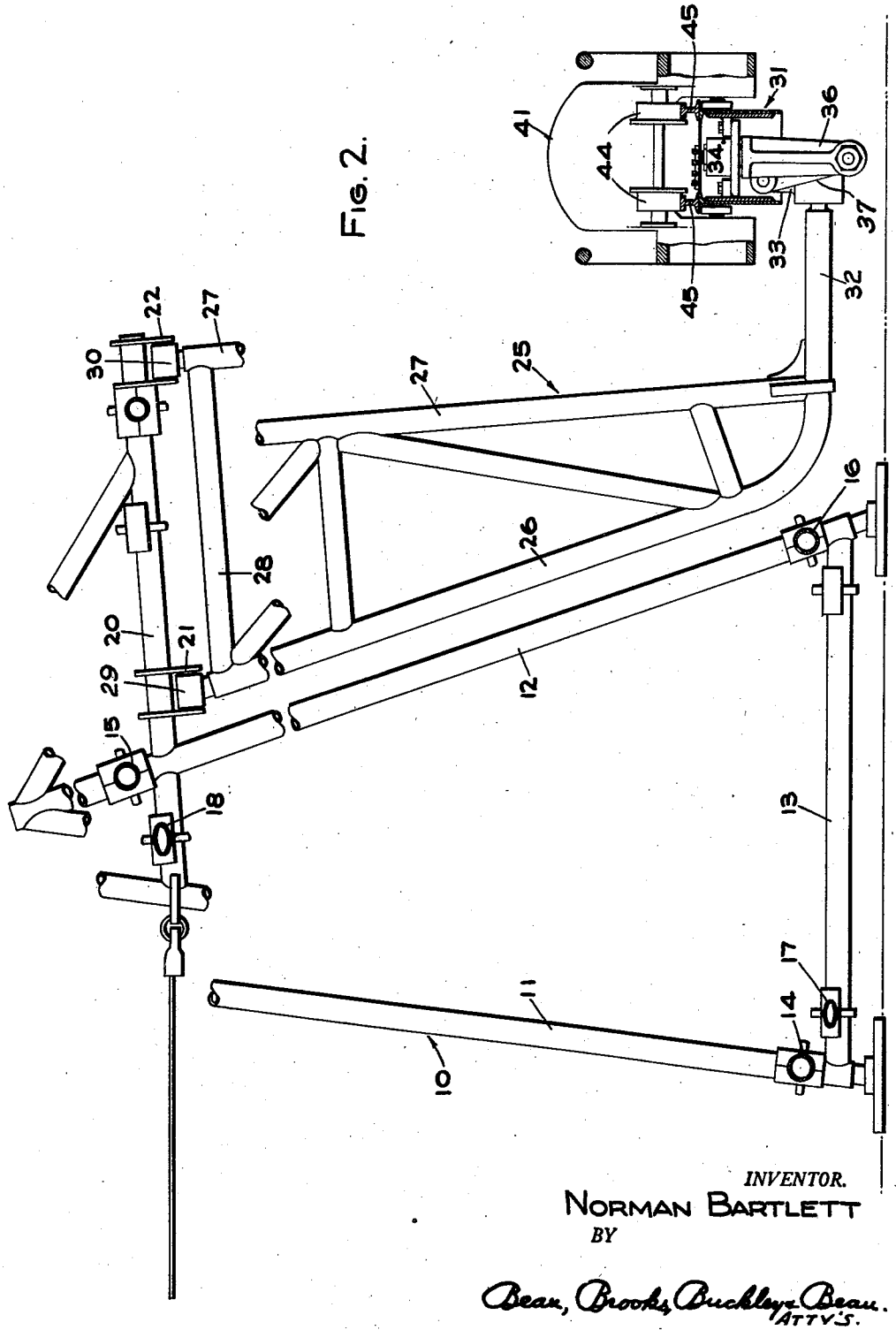
FIG. 2.



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AMUSEMENT RIDE

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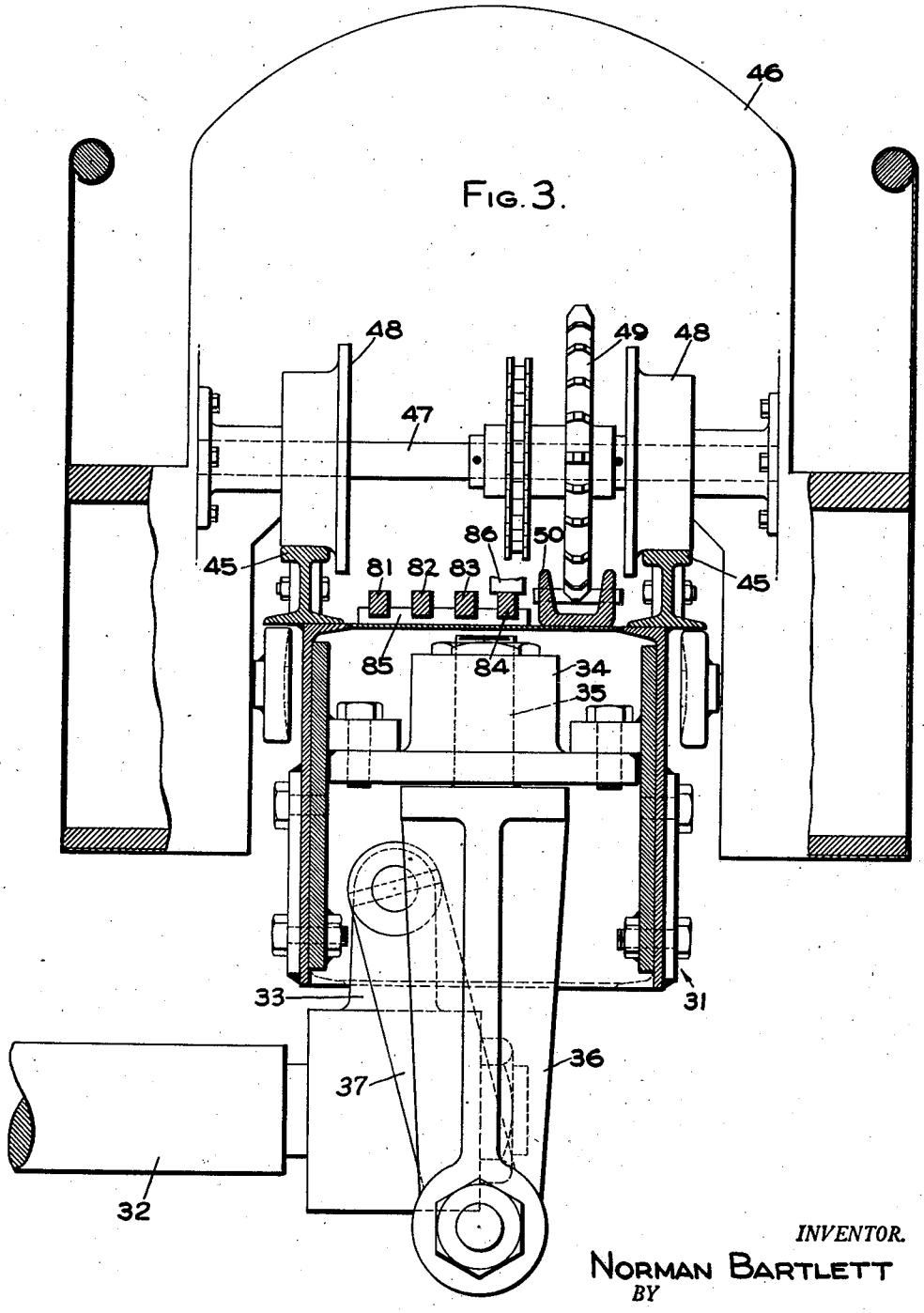
FIG. 3.



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AMUSEMENT RIDE

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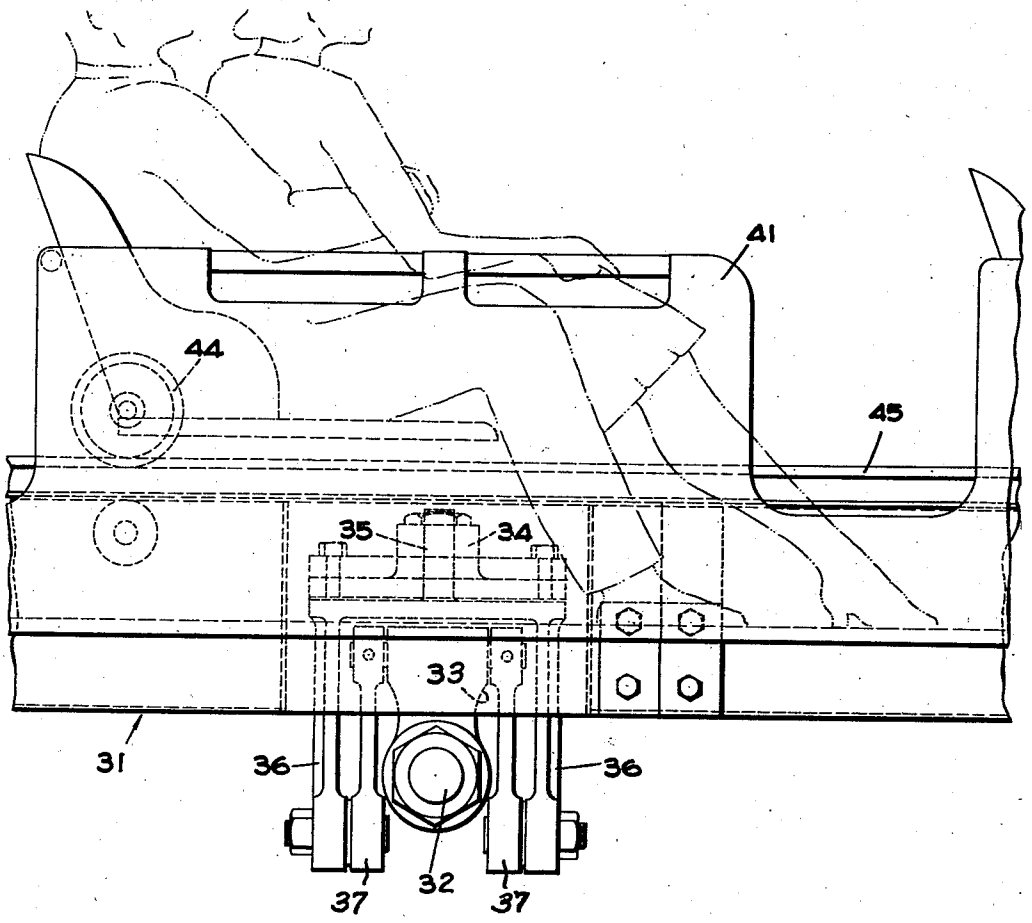

FIG. 4.

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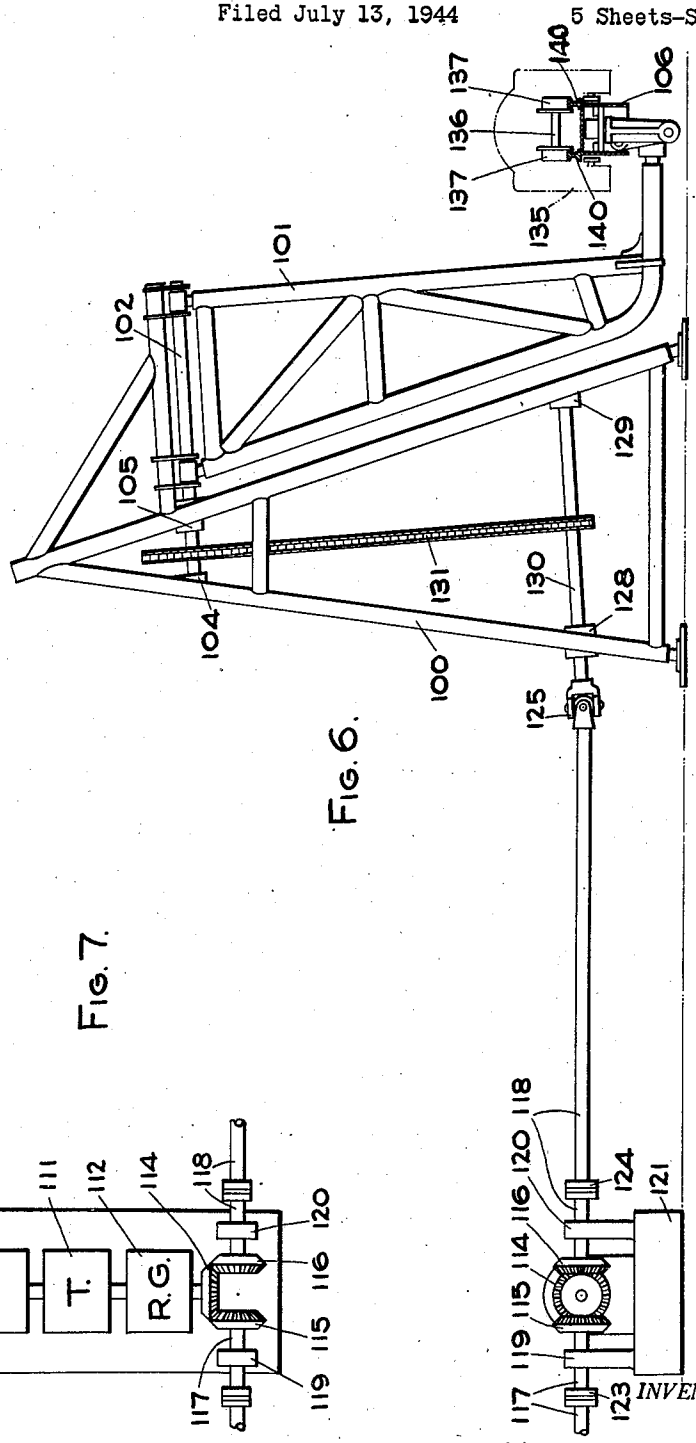

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE

2,428,607

AMUSEMENT RIDE

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Application July 13, 1944, Serial No. 544,731

17 Claims. (Cl. 272—39)

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This invention relates to amusement rides and particularly to a ride of the general type where one or more passenger carriers pursue a continuous circular course.

In its fundamental aspect of novelty the present invention provides a circular trackway which is normally stationary but which is mounted for guided upward movement upon any rotational movement of the trackway from its normal position. Further, means are provided for imparting forces to the trackway tending to rotate the same on an axis substantially coincident with the axis of the circle defining the trackway.

In one form of the invention shown herein by way of example the rotational forces referred to above are imparted to the trackway by utilizing the momentum of one or more passenger cars supported by the trackway, such momentum being arranged to produce track-rotating forces by acceleration and deceleration of the car or cars. In another form illustrated and described in the present specification the trackway itself is swung directly by suitable drive means and in such form the swinging of the trackway may serve as the means of locomotion of a passenger car or cars supported by the trackway.

A clearer understanding of the novel underlying principles of the present invention will be had from a study of the embodiments thereof described in detail hereinafter and illustrated in the accompanying drawings. It is to be understood, however, that the examples set forth are merely illustrative and that many modifications and variations may be introduced without departing from the teachings of this invention, the spirit and scope of which is limited only as defined in the appended claims.

In the drawings:

Fig. 1 is a fragmentary top plan view of one form of the amusement ride of the present invention;

Fig. 2 is a cross sectional view through the right hand side of the generally annular frame work of Fig. 1 on an enlarged scale and with portions broken away;

Fig. 3 is a cross sectional view of the car and track means viewed as in Fig. 2 but on a still further enlarged scale and taken through a self-propelling car;

Fig. 4 is a fragmentary side elevational view of a passenger carrying car;

Fig. 5 is a partly schematic top plan view of a car of the apparatus of Figs. 1 through 4, which is self-propelling and may be employed for propelling the cars connected therewith;

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Fig. 6 is a view taken similarly to Fig. 2 of another form of the ride of the present invention; and

Fig. 7 is a diagrammatic top plan view of the central drive portion of the ride of Fig. 6.

Throughout the several figures of the drawings like characters of reference denote like parts and the numeral 10 designates generally a rigid triangular frame element or truss which is one of a series of similar circularly arranged frame elements, each disposed in a vertical radial plane, with respect to the general axis of the apparatus. Each truss or frame element 10 comprises inner and outer uprights 11 and 12 rigidly secured at their upper ends, as by welding, and a lower connecting element 13, likewise secured as a rigid part of the truss or frame element.

The several radially disposed and annularly arranged frame elements are connected by detachable circumferentially extending braces 14, 15 and 16 and suitable diagonal braces are indicated at 17 and 18 in Figs. 1 and 2. The specific forms of the detachable connections of the braces 14 through 18 are well known to those skilled in the art to which the present invention pertains.

Each frame element 10 rigidly supports an arm 20 which projects radially outwardly therefrom in the vicinity of the upper end of the frame element. Each arm 20, in turn, supports a pair of spaced coaxial bearings 21 and 22, the purpose of which will presently appear. In Fig. 2 the numeral 25 designates generally a rigid triangular frame element which depends from a projecting arm 20 and is adapted to be swung about the bearings 21 and 22. Each of the swinging frames 25 comprises a pair of uprights 26 and 27 and a top cross member 28, all welded or otherwise rigidly secured into a unitary whole. The frames 25 may be reinforced with suitable cross and diagonal bracing as indicated in Fig. 2.

At its upper end each frame 25 has pivotal connection with the bearings 21 and 22 by means of bearings 29 and 30 which are rigidly secured to each frame 25. Each frame 25 is thus arranged to swing in a plane generally tangent to a common circle. Actually, because of the inclination of the pivot axis, the line described by the lower end of each swinging frame is curved as viewed in plan, and such path accordingly more closely follows the general common circle.

A rigid annular trackway is designated generally 31 and is supported at various points thereabout by the swinging frames 25. To this end each frame 25 has a radially projecting member

32 which terminates in a bearing 33. The trackway 31 may comprise a rigid annulus of any desired form. As shown in detail in Fig. 3 the trackway is of inverted box section and has rigidly secured therein a bearing 34 which accommodates a vertical journal 35. The journal 35 has a pair of spaced depending bearing brackets 36.

A pair of links 37 connect pivotally between the lower ends of brackets 36 and bearing 33, the former connection being lowermost whereby the entire annular trackway and its several depending brackets 36 automatically center themselves with respect to the ride framework under the force of gravity.

It is to be understood that the several frames 25 must swing in unison and that such swinging in effect raises and lowers the entire trackway without disturbing its condition of concentricity. The manner in which the swinging of the arms is produced may vary and several ways of swinging the arms are disclosed herein. In any event, the synchronous swinging of the several arms results in successive raising and lowering of the trackway.

Any number of cars may be mounted for movement about the trackway. In the illustrated instance a continuous series of articulated cars is indicated schematically at 40 in Fig. 1. A unit car of such series is shown in elevation at 41 in Fig. 4.

The passenger carrying cars all have freely rotatable wheels 44 for engagement with spaced parallel rails 45 which extend about the annular trackway 31. In the form of the present invention illustrated in Figs. 1 through 5 the prime mover means is associated with one or more of the cars on the trackway, while in the form illustrated in Figs. 6 and 7 the prime mover means is stationary and acts to directly swing the track supporting arms. Referring to Figs. 3 and 5, the numeral 46 designates a power operated car which in the illustrated instance is remotely controlled and need not be employed for the carrying of passengers.

Each power car 46 has a driving axle 47 having wheels 48 fixed thereto for engagement with the rails 45 and, in addition, has fixed thereto a driving sprocket 49. The driving sprocket 49 is in meshing engagement with a stationary rack or spur track 50 which is secured to and extends about the trackway 31. While various forms of rack or spur track may be employed, the one illustrated comprises merely a circularly extending channel having appropriately pitched pins extending transversely through its flanges for meshing engagement between the teeth of the sprocket 49.

Fig. 5 is a schematic plan view of a driving car 46. It will be seen from Fig. 5 that the driving axle 47 is driven from a countershaft 53 by a chain and sprocket connection 54 and the countershaft 53 is in turn connected to the crankshaft 55 of an internal combustion engine 56 by a chain and sprocket connection 57.

During normal operation of the ride of Figs. 1 through 5 it is desired that the engine 56 operate at a fairly constant speed to avoid the necessity for sudden acceleration. For this reason it is necessary to provide a throttle control having only two operating positions, an idling position and a running position. Cessation of engine operation may obviously be effected by cutting the engine ignition circuit. In Fig. 5 the numeral 60 designates an intake manifold having the usually butterfly throttle valve 61 and a valve arm

62. The numeral 63 designates an electromagnet whose armature 64 is connected with arm 62 whereby energization of electromagnet 63 opens the throttle valve 61 to running position. The valve is normally urged to its illustrated idling position by a compression coil spring 65.

The countershaft 53 has interposed therein a centrifugal clutch 67 and a vacuum controlled clutch 68. Countershaft 53 is also provided with a brake 70 which may be of conventional construction and provided with an electromagnet 71 for applying braking force. The vacuum clutch 68 is engageable by the application of subatmospheric pressure thereto and to this end a conduit 73 extends to the intake manifold 60 of engine 56. A solenoid valve 75 controls energization of clutch 68 by selective electrical energization of the solenoid valve winding. The centrifugal clutch 67, vacuum operated clutch 68, and the brake 70 are all conventional commercially available units and their detailed constructions accordingly do not need to be described or illustrated.

Provision is made for controlling the movements of car 46, and accordingly controlling the movements of all of the cars 40, on the trackway 31, from a remote point. In this way it is not necessary for an operator to be aboard any of the cars during operation. Referring to Fig. 3, four current carrying conductors designated 81 through 84 extend in circular spaced concentric arrangement about the trackway 31 between the rails 45. The four conductors are insulated from the supporting trackway 31 and from each other by an annular support member 85 of insulating material. The power car or cars 46 carry conducting brushes, one for continuous engagement with each of the conductors 81 through 84, and the brush in contact with conductor 84 is indicated fragmentarily at 86 in Fig. 3.

The brush (not shown) of conductor 81 may be electrically connected, in any desired manner, to the throttle electromagnet 63. The brush (not shown) of conductor 82 may be electrically connected in any desired manner to the clutch controlling electromagnet 75. The brush (not shown) of conductor 83 may be electrically connected, in any desired manner, to the brake setting electromagnet 71. The return conductors from all three of the foregoing electromagnets may lead to brush 86, whereby conductor 84 comprises a common ground conductor.

The operation of the structure of Figs. 1 through 5 will now be described. The centrifugal clutch 67 may be of any conventional kind and is adjusted to be engaged whenever the engine 56 is operating at or above a predetermined speed. This permits the engine to accelerate freely until the predetermined engagement speed of the centrifugal clutch is reached. It is to be understood that normally, at the commencement of operation, engagement of the centrifugal clutch 67 is merely a preliminary step in operation since the vacuum controlled clutch 68 is normally disengaged.

Through the remote manual switch means, heretofore referred to, the operator of the ride may selectively engage and disengage the vacuum-controlled clutch 68 and the solenoid operated brake 70. Assuming a relatively gradual engagement of clutch 70 and a consequent relatively gradual acceleration of the chain and sprocket drive 54 and axle 47, the driving car 46 and the connected passenger cars 40 would

merely revolve about the trackway 31 at a gradually accelerating rate of speed.

If, then, the operator energizes the solenoid 71 to apply brake 70, simultaneously or preliminarily disconnecting the engine 56 by releasing vacuum-controlled clutch 68, the relatively abrupt deceleration causes the cars 40 and 46 to tend to and, in fact, to actually carry the trackway 31 forwardly with them. This causes all of the frames 25 to swing forwardly in unison, simultaneously raising the trackway 31 without affecting its concentricity. When the swinging reaches its forward crest the operator may release the brake and backward swinging may be augmented by simultaneously engaging the clutch 68 to rapidly accelerate the cars, since the reaction of the trackway to such acceleration applies a rearward swinging force to the frames 25.

When the backward swing of frames 25 has reached a peak, the operator may add to the amplitude and velocity of swinging by releasing the clutch and reapplying the brake, whereby the momentum of the car may augment the full forward swing of the frames. The foregoing accelerating and braking actions may be applied intermittently during swinging cycles of the frames, as for instance during only the beginning and end of each swing, to permit the cars to maintain a more constant normal velocity in general.

Repetition of the foregoing deceleration and acceleration of the cars in successive swinging cycles of the frames will build up the amplitude of such swinging and, being accompanied as it is by forward movement of the cars on the trackway at varying speeds, there is produced a "rolling" or undulating generally forward motion which is of a highly novel character.

The degree to which the amplitude of springing may be built up is not precisely limited. As in the case of an ordinary child's swing the limiting factor would be considerations of safety. As a practical matter the compensating means including links 37 will be effective only between certain extreme limits which will determine the maximum possible amplitude of swing.

In the form of the present ride shown in Figs. 6 and 7 the several cars are not themselves power driven and their rotation on the trackway is attained indirectly by imparting a positive driving oscillation to the supporting frames. A better understanding of the mode of causing propulsion of the passenger cars on the annular trackway in the construction of Figs. 6 and 7 will be had after a perusal of the ensuing description of the details of construction and operation. So far as the construction is the same as in the previously described modification, the following description will, for simplicity, be merely in general terms.

As appears clearly in Fig. 6, an annular framework is provided which is composed of rigid triangular frame elements 100, each disposed in a radial plane with respect to the main vertical axis of the ride as a whole and interconnected and braced as in the case of Figs. 1 and 2. A swinging frame 101 is supported by each frame element 100 as in the preceding embodiment but in Fig. 6, the frame 101 has a rock shaft 102 rigid therewith and extending into bearings 104 and 105 carried by the associated frame element 100. The rock shaft 102 may be forcibly oscillated in any desired manner to swing the frame 101.

In the ride of the embodiment now being described it is basically only necessary that one of the several frames 101 have a rockshaft 102 for positive oscillation. The other swinging frames may be freely pivotally suspended as in Fig. 2. Since a rigid annular trackway 106 is connected to the several frames 101, in the same manner as described in connection with Figs. 1 through 5, such trackway will serve as a driver for the freely pivoted frames 101 and cause all of them to swing synchronously with the driven frame. However, to better distribute the various stresses and the driving force, I presently propose positively and synchronously driving two diametrically opposite frames 101, the remainder being swung synchronously therewith through the intervention of the trackway 106.

While various alternative means may be employed, one suitable driving arrangement for the frames 101 is illustrated more or less fragmentarily in Figs. 6 and 7. This arrangement comprises a reversible electric motor 110, an automotive change-speed transmission 111, and a reducing gear box 112 of conventional form for materially reducing the relatively high motor speed, even as modified by the transmission.

The final drive from the reducing gear is through a bevel gear 114 which meshes at opposite sides with a pair of coaxial bevel gears 115 and 116 to rotate them in directions opposite to each other. The gears 115 and 116 are fixed to shafts 117 and 118 journaled in bearings 119 and 120 supported on a common base element 121 which supports all of the foregoing driving instrumentalities.

The shafts 117 and 118 extend radially outwardly, have flexible couplings 123 and 124 interposed therein, and terminate in universal joints, the universal joint for shaft 118 being designated 125 in Fig. 6. The two frame elements 100 which have bearings 104 and 105 for the rock shaft 102 also have lower bearings 128 and 129 which receive a shaft 130, the latter being engaged with the universal joint 125 for being driven from shaft 118 in the case of Fig. 6. The shafts 102 and 130 are connected by a chain and sprocket drive 131.

It will be seen from the foregoing that an operator may, by energizing motor 110 and periodically reversing its direction, cause the frames 101 to swing in any desired degree of amplitude, the swinging of the frames and the trackway 106 being of the same fundamental character as that produced in the form of ride shown in Figs. 1 through 5.

In Fig. 6 a passenger car 135 is shown schematically and has a dead axle 136 secured against rotation. Wheels 137 mounted on axle 136 embody free-wheeling clutch means of any desired conventional form, the details of which are not illustrated and many optional forms will occur readily to those skilled in the art. Suffice it to say that the wheels 137 are free to rotate on axle 136 in a forward direction, which may be away from the observer as viewed in Fig. 6, but are not susceptible of rotation in the opposite direction on axle 136.

In the ride of Figs. 6 and 7 the pasenger cars 135 are merely mounted on rails 140 secured to the trackway 106, with no further driving connections and without the necessity for a pulling or propelling car or other equivalent means. Movement of cars 135 about the trackway is produced solely through inertia or momentum forces derived from the swinging of frames 101 which is produced through alternate reverse rotation of the driving motor 110.

When the frames 101 and the trackway 106

swing forwardly, with respect to the desired direction of movement of cars 135 on the trackway, the cars are carried therewith owing to the inability of the wheels 137 to rotate reversely. The cars are thus given a forward acceleration. However, as the forward swinging of frames 101 slows and ceases, the cars continue to roll forward freely under the momentum which they have acquired.

Reverse swinging of the frames 101 thus has no effect on the forward movement of cars 135, which merely lower and raise during such reverse swinging, whereby they have the same rolling forward movement as in the first described embodiment. The next successive forward swing of the frames 101 will reaccelerate the cars 135, assuming they have decreased speed due to frictional losses, and, if the velocity of the swinging be accelerated, will further accelerate the cars. The forward speed of cars 135 is thus dependent upon the speed and amplitude of swinging of the frames 101 which in turn is directly under the control of the ride operator, who may vary the intervals of reversal of motor 110, and who may also shift the transmission 111 to a higher speed ratio as faster, wider-amplitude operation is feasible.

What is claimed is:

1. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, said circular trackway being supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, and car means mounted for movement along the trackway.

2. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, said circular trackway being supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, and car means mounted for movement along the trackway, and power means for swinging said supports whereby said car means is alternately raised and lowered during movement about the trackway.

3. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, said circular trackway being supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, and car means mounted for movement along the trackway, power means for swinging said supports to alternately raise and lower the trackway and said car means, and a uni-directional driving connection between said trackway and said car means whereby swinging of said supports causes the car means to rotate about the trackway in one direction.

4. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, said circular trackway being supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, and drive means for variably propelling the car means on said trackway whereby alternate positive and negative acceleration thereof causes swinging of said supports through the momentum of the car means.

5. In an amusement ride, an elevated support comprising a plurality of bearings having their axes radiating from a common center, arm means depending from said bearings for swinging movement whereby the lower portions of the several arm means swing in paths lying generally along a common circumference, a circular trackway concentric with such circumference and supported by the lower portions of the arm means, whereby synchronous swinging movement of the several arm means alternately raises and lowers the trackway, and a passenger car mounted for movement along the trackway.

6. In an amusement ride, an elevated support comprising a plurality of bearings having their axes radiating from a common center, arm means depending from said bearings for swinging movement whereby the lower portions of the several arm means swing in paths lying generally along a common circumference, a circular trackway concentric with such circumference and supported by the lower portions of the arm means, whereby synchronous swinging movement of the several arm means alternately raises and lowers the trackway, a passenger car mounted for movement along the trackway, and power means for swinging said arm means whereby said car is alternately raised and lowered during movement about the trackway.

7. In an amusement ride, an elevated support comprising a plurality of bearings having their axes radiating from a common center, arm means depending from said bearings for swinging movement whereby the lower portions of the several arm means swing in paths lying generally along a common circumference, a circular trackway concentric with such circumference and supported by the lower portions of the arm means, whereby synchronous swinging movement of the several arm means alternately raises and lowers the trackway, power means for swinging said arm means to alternately raise and lower said trackway and said car, and a uni-directional driving connection between said trackway and said car whereby swinging of said arm means causes the car to rotate about the trackway in one direction.

8. In an amusement ride, an elevated support comprising a plurality of bearings having their axes radiating from a common center, arm means depending from said bearings for swinging movement whereby the lower portions of the several arm means swing in paths lying generally along a common circumference, a circular trackway concentric with such circumference and supported by the lower portions of the arm means, whereby synchronous swinging movement of the several arm means alternately raises and lowers the trackway, a passenger car mounted for movement along the trackway, and drive means for variably propelling the car means on said trackway whereby alternate positive and negative acceleration thereof causes swinging of said arm means through momentum forces.

9. In an amusement ride, a circular trackway, car means, and means mounting the car means for movement guidedly about the trackway, said trackway being mounted for oscillation about its central substantially vertical axis, drive means for so oscillating the trackway, and uni-directional wheel means associated with said car

mounting means, whereby oscillation of said trackway causes the car means to rotate about the trackway substantially continuously in one direction.

10. In an amusement ride, a circular trackway, car means, and means mounting the car means for movement about the trackway, said trackway being mounted for oscillation about its central substantially vertical axis, and drive means for variably propelling the car means on said trackway whereby alternate positive and negative acceleration of said car means causes oscillation of the trackway through the momentum of the car means.

11. In an amusement ride, a circular trackway, car means, and means mounting the car means for movement guidedly about the trackway, said trackway being mounted for oscillating movement about its central substantially vertical axis, said mounting means including traction wheels, means providing for rotative movement of said car means in but one direction on and relative to said trackway, and motive means for selectively and variably effecting one of said movements whereby the other movement is concomitantly produced through inertia forces.

12. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, a circular trackway concentric with such circumference and supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, prime mover means associated with said car means, clutch and brake means therefor, and clutch and brake control means whereby an operator may selectively accelerate said car means positively and negatively to swing said supports.

13. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, a circular trackway concentric with such circumference and supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, prime mover means associated with said car means, clutch and brake means therefor, and clutch and brake control means disposed remotely from said car means whereby an operator removed from the car means and trackway may selectively accelerate said car means positively and negatively to swing said supports.

14. In an amusement ride, a circular trackway, means for supporting said trackway in a predetermined normal position and for guiding the same to move upwardly upon rotation thereof from normal position, and car means movable on said trackway and operable to move said trackway rotatably upwardly by change of velocity of the car means reacting on said trackway.

15. In an amusement ride, a circular trackway, means for supporting said trackway in a predetermined normal position and for guiding the same to move upwardly upon rotation thereof from normal position, car means movable about said trackway, and drive means for intermittently applying rotational forces to said trackway to cause the car means to raise and lower during movement thereof along said trackway.

16. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, a circular trackway concentric with such circumference and supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, and reversible motor means operatively engaging one of said supports for selectively applying variable swinging forces thereto.

17. In an amusement ride, a circular trackway, a plurality of circumferentially spaced depending supports arranged for swinging movements in planes generally following the circular extent of said trackway, a circular trackway concentric with such circumference and supported by the lower portions of the depending supports whereby synchronous swinging of the several supports alternately raises and lowers the trackway, and a uni-directional driving connection between said trackway and said car means whereby swinging of said supports causes the car means to rotate about the trackway in one direction.

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