Oct. 20, 1964 N. BARTLETT 3,153,536

PASSENGER CARRYING ROUNDABOUT

Filed May 27, 1963 4 Sheets-Sheet 1

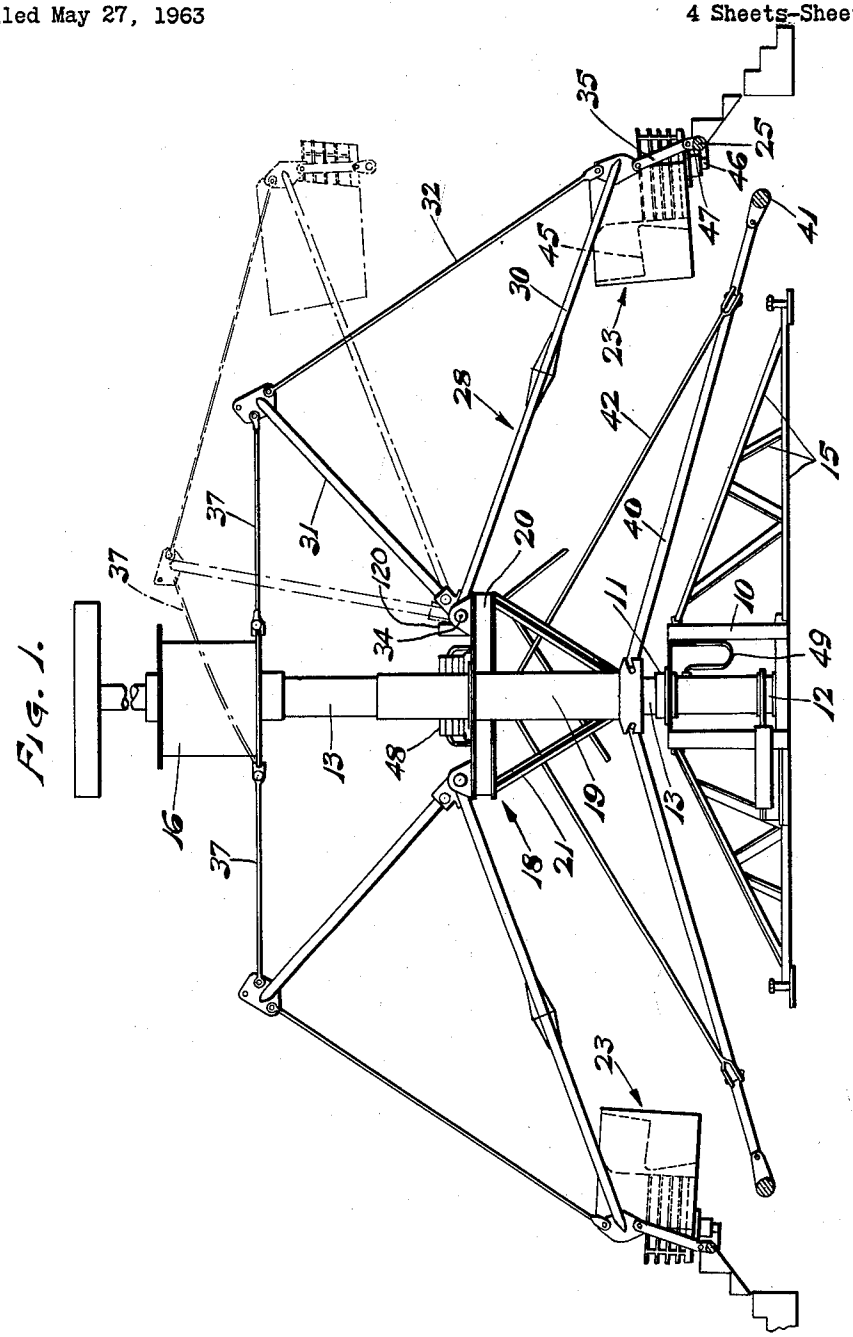

FIG. 1.

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PASSENGER CARRYING ROUNDABOUT

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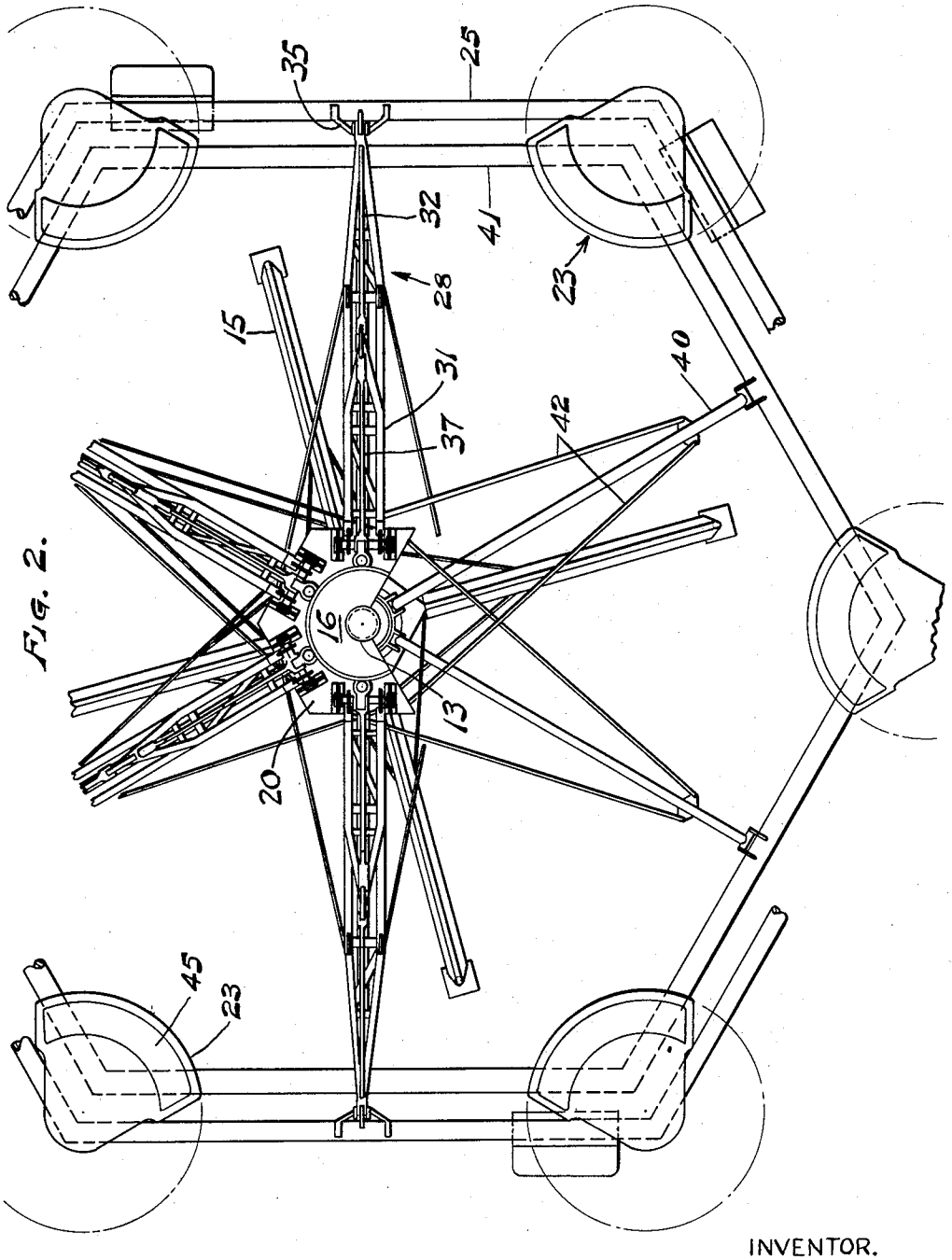

FIG. 2.

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PASSENGER CARRYING ROUNDABOUT

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FIG. 3.

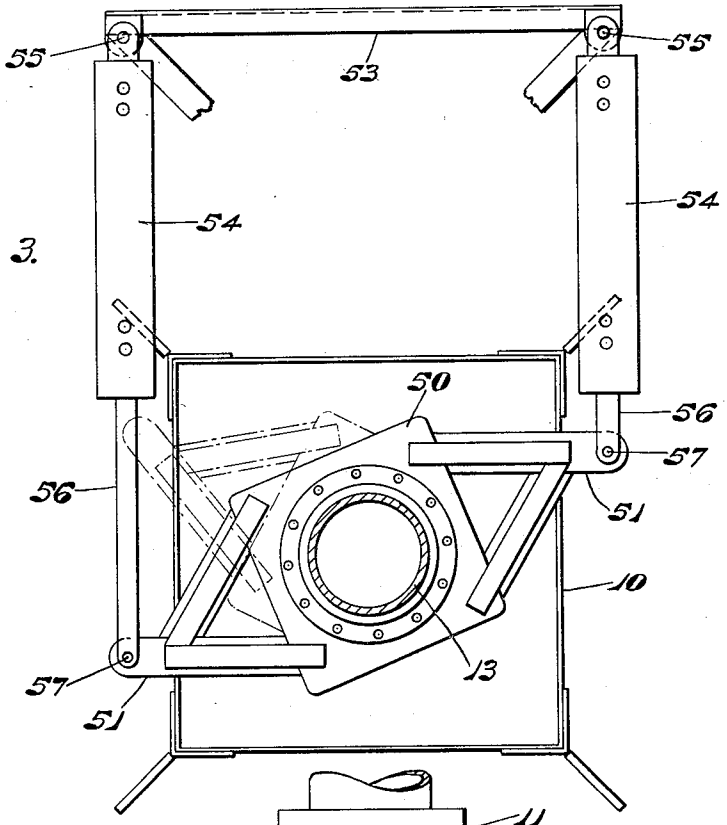
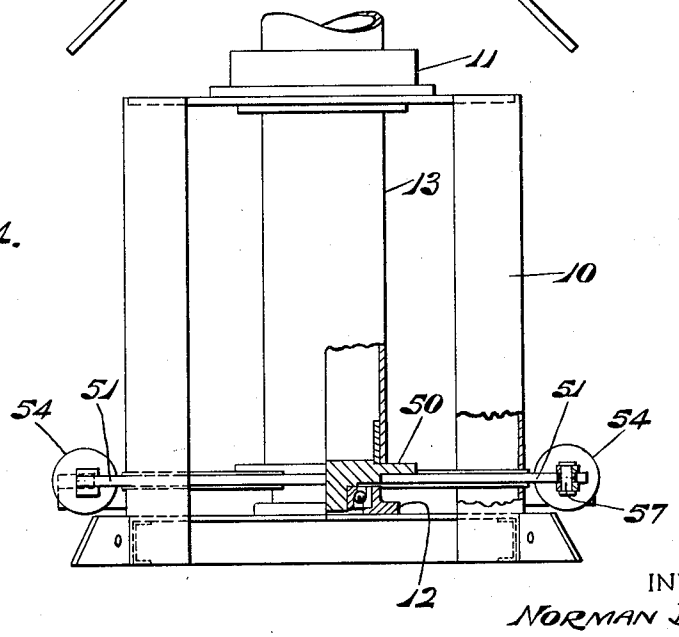


FIG. 4.



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PASSENGER CARRYING ROUNDABOUT

Filed May 27, 1963 4 Sheets-Sheet 4

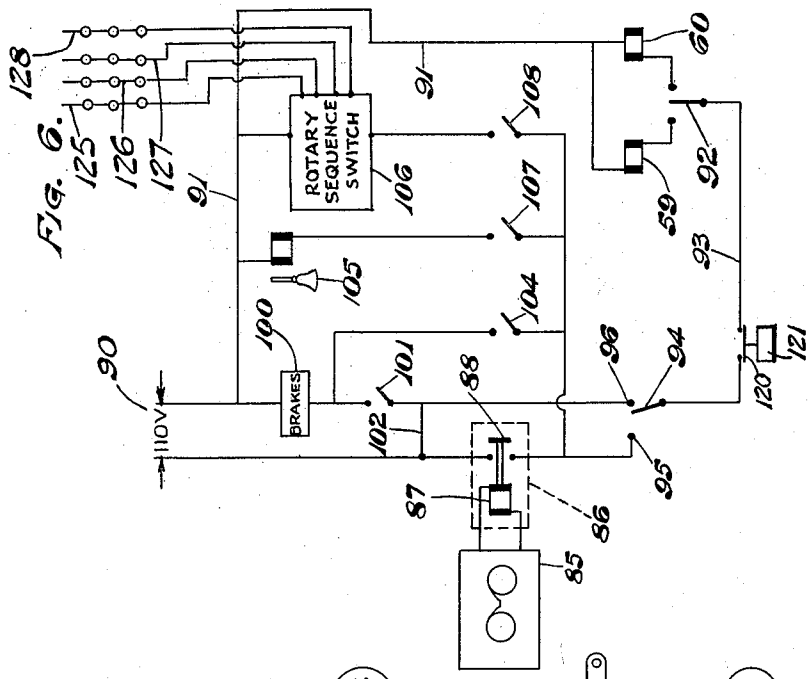

FIG. 6.

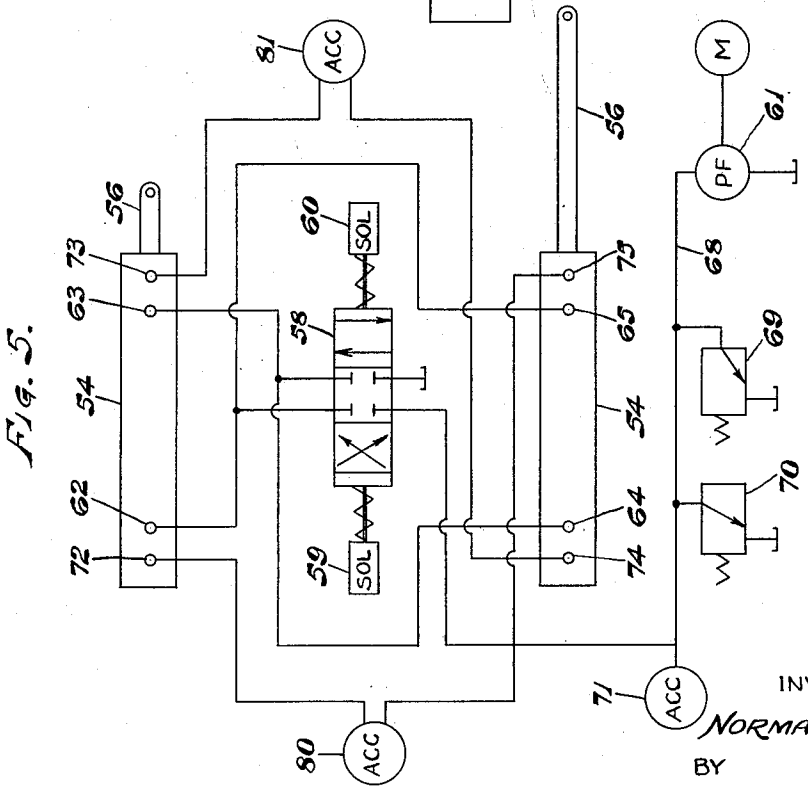

FIG. 5.

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3,153,536

PASSENGER CARRYING ROUNDABOUT

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Filed May 27, 1963, Ser. No. 283,398
4 Claims. (Cl. 272—36)

This invention relates to passenger carrying amusement rides such as are used in amusement parks, carnivals and the like.

One aspect of the present invention comprises a substantial improvement in an amusement ride of the general type shown in my prior Patent No. 2,629,593, granted February 24, 1953. In the amusement ride of that patent an annular passenger carrying support is associated with central supporting means in such manner that its rotative or oscillative movements are accompanied by concentric rising and falling movements of the annular support so that the actual path of the passenger seats or passenger compartments on such annular support are undulating, or resemble swinging movement.

In the ride of the aforesaid patent the annular support is suspended, at least in part, from cable devices which wind upon a central drum so that if the drum is stationary and the annular support is oscillated concentrically with respect to the drum, the supporting cables wind upon the drum due to the relative rotative movements of the annular support relative to the drum, such winding and unwinding movements causing the annular support to be raised and lowered in the course of its oscillating movements.

The ride of the present invention involves a significant departure from the teachings of my prior patent in that in the ride of the present invention means are provided for oscillating the central drum concentrically to and fro to produce a winding and unwinding movement thereon of cable devices from which the annular passenger carrying support is suspended in whole or in part. Thus the oscillating movements of the drum member may comprise the sole power input from which the passenger supports are oscillated and caused to rise and fall. This produces novel physical oscillative and rising and falling movements and, furthermore, produces passenger support movements entirely as a result of the oscillation of the winding drum without the necessity of transmitting driving forces directly to the annular passenger support per se. In combination with the foregoing the ride of the present invention provides means for winding the cables on the drum in a much more effective and practical manner than heretofore.

A further improvement of the amusement ride of the present invention, particularly as contrasted with the amusement ride of my aforesaid prior patent, comprises the provision of energy-storing inertia means operable to produce desired oscillatory movements of the annular passenger support with a much lower speed and with a much lower power input than would be necessary without such energy-storing means. In the ride of the present invention the provision of such energy-storing means directly associated with the oscillatory annular passenger support makes the amusement ride more practical since without such means the rotational speed required to provide sufficient "wind-up" and lift is greater. With the flywheel effect of the energy-storing means the passenger support rises to full height at a much slower rotational speed which makes the ride more practical, more pleasurable and safer.

Furthermore, at the higher operational speeds which are required without the energy-storing means the power input requirement is greater and requires support structure, drum structure and suspending cable and arm structure having higher strength characteristics than with the energy-storing means.

More specifically, the ride of the present invention may be provided with an energy-storing flywheel ring of approximately the diametral extent of the annular passenger support which is movable with such support as to the rotary components of movement about the vertical axis of the amusement ride but which is so related to the annular passenger support that it does not partake of the vertical components of movement thereof.

A clearer understanding of the various novel underlying principles of the present invention which are merely pointed out generally above will be had from a study of the embodiment thereof illustrated in the accompanying drawings and described in detail in the following specification. It is to be understood, however, that the example thus disclosed is merely illustrative and that many modifications and variations may be introduced without departing from the teachings of the present invention, the spirit and scope of which is limited only as defined in the appended claims.

In the drawings:

FIG. 1 is a general somewhat schematic side elevational view of one form of the amusement ride of the present invention;

FIG. 2 is a fragmentary top plan view of the ride shown in FIG. 1 with portions thereof broken away to illustrate the underlying structure;

FIG. 3 is a fragmentary top plan view of the central base portion of the ride of FIGS. 1 and 2 with the central column thereof shown in transverse cross section;

FIG. 4 is an elevational view of the structure shown in FIG. 3 but with portions thereof broken away;

FIG. 5 is a schematic view showing the hydraulic circuitry employed in one form of the general ride arrangement of the present invention; and

FIG. 6 is a wiring diagram showing the electrical control circuits thereof.

Throughout the several figures of the drawing, like characters of reference denote like parts and the numeral 10 designates a central base structure, which includes upper and lower bearings 11 and 12 which rotatably support a vertical column or hollow shaft 13. As indicated in FIG. 1, the central base structure 10 is laterally braced by structural members indicated by the general designating numeral 15.

As best shown in FIG. 1, a winding drum 16 is fixed to the upper portion of column 13 for rotation therewith. A central rotatable cage structure which comprises arm supporting means is designated generally by the numeral 18 in FIG. 1 and comprises a bearing sleeve 19 which is rotatable upon and with respect to column 13 and includes a platform 20 and platform reinforcing structure 21.

In FIG. 11 the individual passenger carries or cars are designated generally by the reference numeral 23 and are mounted upon a rigid annular passenger carrier support member 25. The member 25 may be considered as a continuous ring concentric with the column 13 although as shown in FIG. 2, for structural convenience, the annular member 25 comprises a regular polygon having a number of sides equal to the number of passenger carries 23. The annular member 25 is suspended by suspension arm arrangements designated generally by the reference numeral 28 in FIGS. 1 and 2, such suspension arrangements engaging the annular support 25 midway between each adjacent pair of passenger carriers 23, as clearly indicated in FIG. 2.

Each suspension device 28 comprises a truss formed by obliquely projecting arms 30 and 31 connected at their outer ends by a link 32, the arms 30 and 31 being pivoted adjacent to their juncture to platform 20 as indicated at

34. The arms 30 are preferably hinged at their midpoints as indicated in FIG. 1 to provide knockdown construction and facilitate transportation and erection.

Since the outer end of each suspension device 28 moves in and out with respect to the vertical axis of column 13 upon pivotal movement thereof, a triangular link 35 connects between the outer end of arm 28 and annular support 25 to permit free up and down pivotal movement of each suspension device 28 and accompanying up and down movement of the annular support 25 and the several passenger carriers 23 which are supported thereon. The triangular construction of link 35 shown in FIG. 2 maintains or holds the annular support 25 concentric to the column 13 at all times. This triangular link construction is particularly important when passenger loading in a carrier is eccentric since it maintains stability and concentricity and provides a smooth ride despite such eccentric loading.

A cable 37 connects between the outer end of each arm 31 and the base of winding drum 16, as shown in full lines in FIG. 1 and in the lower or rest position of annular support member 25 and the passenger carriers 23 these members and the several suspension devices 28 are supported against further lowering movement by the cables 37. It will be noted that apart from the cable connections the structure comprising the central cage 18, the several suspension devices 28, the annuler support 25 and the passenger carriers 23, is rotatable as a unit with respect to the central column 13 to which winding drum 16 is fixed.

In addition to the suspension devices 28, the central rotatable cage 18 has radiating from the lower portion thereof, that is from the lower portion of the sleeve 19 thereof, a plurality of arms 40 which connect at their outer ends with a flywheel ring 41, the arms 40 being supported in the position illustrated in FIG. 1 by tension bars 42 which connect between outer portions of arms 40 and the central cage structure 18. Thus the flywheel ring 41 rotates with the suspension device 28 and the annular support 25 but does not partake of vertical movements of those parts. As in the case of annular support 25, the flywheel ring 41 is also polygonal in contour, as shown in FIG. 2, mainly as a matter of structural convenience.

Each passenger carrier 23 comprises a seat portion 45 and is pivoted to support 25 as at 46 so that the carrier may rotate on a generally upright axis. Since the carriers are generally eccentric with respect to pivots 46 and since the pivot axes are inclined so that their upper ends lean inwardly as shown in FIG. 1, the carriers will tend to gravitate to the positions shown in FIG. 1, although accelerating and decelerating movements of the support 25 will cause the carries to oscillate on their pivots 46.

Associated with each pivot 46 is an electrically energized brake 47 which may be remotely operated to arrest or retard pivotal movement of a carrier 23 or hold the same in a desired rest position. The control conductors for the brakes 47 of the several passenger carriers may extend through a brush assembly designated 48 in FIG. 1 by way of a flexible conductor designated 49. The conductor 49 carries current from a relatively stationary source to column 13 which oscillates only 22½° in each direction and the brushes 48 carry the current from the oscillating column to the cage structure 18 which may rotate 180° in each direction.

If desired a flexible conductor may likewise be used between column 13 and the rotatable cage 18 instead of the brush assembly shown in FIG. 1 merely by way of example. The foregoing conductor means is provided so that the brakes may be selectively energized and released by the operator of the ride who may be located at any convenient point adjacent to the ride.

In the form illustrated herein the amusement ride of the present invention is activated primarily through controlled power oscillation of drum 16, the structure comprising the bearing 19, cage structure 18, suspension means 28, annular support 25 and passenger carriers 23 being entirely free to rotate on the axis of column 13 excepting for the cable connections between suspension means 28 and drum 16. The flywheel element 41 and its supporting arms 40 also rotate as a unit with the cage structure, the annular support 25, and the passenger carriers.

Reference will now be had to the power means for oscillating the central column 13 and the winding drum 16 which is fixed thereto and in this connection, reference will be had particularly to FIGS. 3 and 4, wherein a flange member 50 fixed to the base of rotatable column 13 has a pair of oppositely disposed projecting arms 51. The central base support 10 includes a rigid bracket portion 53 and a pair of hydraulic operating cylinders 54 are each pivoted at one end to bracket 53 as at 55. Piston rods 56 project from the other ends of cylinders 54 and are pivoted to arms 51 as at 57.

The hydraulic system for controlling motive impulses of the cylinders 54 will be discussed in greater detail in conjunction with the operational diagram, FIG. 5, although it will noted from FIG. 4 that the cylinders 54 move oppositely to jointly oscillate column 13. That is, beginning with the position of FIG. 3, the piston rod 56 at the right of FIG. 3 will project and piston rod 56 at the left of FIG. 3 will retract to oscillate column 13, in the present instance and by way of example only, a distance of about 45 degrees in a clockwise direction. Upon joint reverse movement of the piston rods 56 column 13 will be reversely rotated a like amount.

FIG. 5 shows the hydraulic circuitry for controlling the operation of the cylinders 54 either manually or in synchronism with a tape recording, the tape recording containing recorded music and program impulses synchronized with the music and connected to selectively produce automatic power operation of cylinders 54 and the passenger carrier pivot brakes 47 as well as other adjuncts such as bells or similar sounding devices and lighting means.

In FIG. 5 the numeral 58 designates a spring centered solenoid operated four-way valve which has operating solenoids 59 and 60 for selectively transmitting pressure fluid from a pump 61 to operating ports 62, 63, 64 and 65 at opposite ends of the cylinders 54. The arrangement is such that when operating pressure is connected to the ports 62 and 65 at opposite ends of the two cylinders 54, the ports 63 and 64 will be connected to tank and vice versa.

An hydraulic fluid supply line 68 from pump 61 to valve 58 includes a pressure relief valve 69 and an unloading valve 70 and it will be noted that an accumulator 71 is in communication with supply line 68 which leads to the inlet port of four-way valve 58. Thus, as will appear later herein, an operator controlling a double throw switch can cause the piston rods 56 to move opposite to each other in either direction or he can hydraulically block the piston rods against movement since four-way valve 58 is, in the present instance, of the "closed center" type.

Ports 72, 73, 74 and 75 at opposite ends of the cylinders 54 beyond the ports 62 through 65 provide an hydraulic pressure cushioned end zone. The ports 72 and 75 connect with an accumulator 80 and the ports 73 and 74 connect with accumulator 81 whereby when the pistons of the cylinders 54 move beyond the operating ports 62 through 65 in either direction their further movement is cushioned against the yieldable fluid resistance of the accumulators 80 or 81, as the case may be.

Reference will now be had to the wiring diagram, FIG. 6. The numeral 85 designates a tape recorder for producing music in accompaniment to the ride operation, usually through a suitable public-address amplifying system. The numeral 86 designates what is known in the art as a "programmer" which may be built into the tape recorder or may comprise a separate component.

In the form contemplated herein the programmer comprises an electromagnet 87 which actuates a switch 88 for controlling normally open contacts.

In a preferred "programmer" arrangement the tape which bears the sound record for producing music also bears periodically occurring recorded beats or pulses which produce periodic electrical signals or impulses for energizing electromagnet 87 which momentarily closes switch 88. These recorded beats or pulses on the tape are synchronized with the recorded music so that the switch reversals are in time with the rhythm or cadence of the music and the beats or pulses may be of predetermined duration so that both the frequency or periodicity of the switch closures and their individual duration periods are established according to requirements.

In FIG. 6 the windings for actuating the four-way valve 58 in opposite directions are indicated at 59 and 60. One side of each winding is connected to one side of a power supply 90 by a conductor 91 and the other sides of the windings 59 and 60 are connected to opposite contacts of a double throw switch 92 which selectively connects one or the other of the windings 59 and 60 to a return conductor 93.

Return conductor 93 leads to a double throw selector switch 94 having contacts 95 and 96. Contact 96 is connected directly back to the other side of the power supply whereas contact 95 leads through the contacts of the programmer switch 88.

In FIG. 6 the operating solenoids of the several passenger carrier pivot brakes 47 are indicated schematically at 100 and alternative manual and automatic operating circuits for the brake operator solenoids are provided. By means of a switch 101 an operator may selectively engage and disengage the brakes at will, this manual circuit being by way of a conductor 102. Switch 101 is employed principally in setting the passenger carrier brakes to hold the carriers against pivotal movement during periods when passengers are being loaded and unloaded.

An alternative brake operating circuit through a manually closable switch 104 includes the contacts of the programmer switch 88. When switch 104 is closed the brakes are momentarily operated periodically in time with the music so that the free pivotal movements of the carriers are periodically snubbed or arrested which correlates the physical movement sensation of the passengers with the music.

Similar use may be made of these periodic electrical impulses in actuating a bell 105 and a light change system 106, manual selector switches designated 107 and 108, respectively, being provided for selectively activating these adjuncts. The sounding of a bell in time with the music adds materially to the overall rhythmic sensations of the passengers. As to the light change system, it is contemplated that periodic operations of switch 88 will change the color of illumination of the ride, either by employing changeable light filters or by employing a plurality of lamp networks of various colors.

A typical mode of operation of the foregoing apparatus is generally as follows, although numerous variations and modifications may be practiced within the scope of the present invention and within the capabilities of the foregoing apparatus. The operator of the ride has under his immediate control the double throw switch 92 which enables him to control the position of four-way valve 58 so that it is either in the neutral position with respect to cylinders 54 or in position to actuate the same in eiher direction.

Also under the control of the operator are the manual and automatic control switches 104 and 101 which serve as common energizing switches for the several electric brake mechanisms 47 which control pivotal movements of the passenger carriers 23 on the pivots 46. In addition, the operator has immediate access to the bell

switch 107, light change switch 108 and the selector switch 94 which introduces pulsating rhythmic variations in the swinging movements of the passenger carriers as will presently appear. All of the foregoing control switches may be conveniently arranged in an operating console or switch panel.

In initiating a period of operation, the operator throws control switch 92 in one direction which, through four-way valve 58 and hydraulic cylinders 54, rotates column 13 approximately 45° in one direction. Rotary movement of the column in such direction is terminated automatically by operation of the end ports of the cylinders since the pistons close ports 62 through 65 to interrupt the supply of operating pressure and the ports 72 through 75 activate the accumulators 80 and 81 as previously described. Accordingly, there is no absolute necessity for the operator to immediately move the control switch 92 to a neutral position at the end of a sweep or swing since limit movement will be determined by operation of the cushioning ports 72 through 75 whether the valve 58 is in either of its operating positions or in neutral position.

This oscillation of column 13 causes the suspended annular support 25 to rotate in the same direction by reason of the suspending cables 37. Although the movement of the annular support 25 may lag behind the movement of column 13 and drum 16 initially, it will catch up with and exceed the degree of rotary or angular movement of column 13 and drum 16 due to momentum of the annular support 25 and the parts movable therewith and also particularly due to the added momentum introduced by the flywheel ring 41.

During this movement of annular support 25 beyond the degree of movement of column 13 and winding drum 16 the cables 37 are caused to wrap around drum 16 and this winding of the cables exerts a radially inward pulling force at the juncture of arm 31 and link 32 which pivots each of the suspending structures 28 upwardly and thus raises annular support 25 and the passenger carriers 23.

At about the time that the momentum of the suspended annular support member 25 and associated parts is dissipated and such parts would naturally reverse their movement due to gravity and the unwinding forces resulting therefrom the operator reverses control switch 92 to oscillate column 13 and drum 16 approximately 45° in the opposite direction. In this period of movement the annular support 25 and the passenger carriers will swing farther in the opposite direction than in the first period due to the added rotational force produced by the gravitational downward movement of annular support member 25 and the passenger carriers which occurs during the first part of this swing or sweep of the annular support member 25. Thus, the cables 37 will wrap around winding drum 16 in the opposite direction a greater degree than on the first oscillation.

When the momentum in this direction is about dissipated and the passenger carriers and support member 25 are about at the point of again reversing their direction of oscillation due to gravitational forces and the resultant unwinding tendency, the operator again reverses control switch 92 and this time the swing of the annular support 25 and the passenger carriers mounted thereon will exceed the second swing and, due to the resultant greater wrapping movement of cables 37, the passenger carriers and annular support 25 will raise even higher.

After some six or seven such swings or sweeps during which there is a progressive buildup of the amplitude of oscillation of the passenger carriers 23 and annular support member 25, the passenger carriers reach a maximum safe operating height approximately as illustrated in dot and dash lines in FIG. 1. The helical wrapping of cable 37 on the drum 16 during this maximum lifting movement of the passenger carriers is likewise shown in dot and dash lines.

In exercising manual control of the reversal of drum

16 through switch 92 the operator may reverse the drum ahead of the top point of the swing of the passenger carriers so that, as the carriers complete their swing in one direction, they are given an extra lift due to the additional winding caused by the fact that the carriers are still moving in one direction while the drum has already begun its movement in the other direction.

Merely by way of example, this maximum rotary movement of annular support 25 and the passenger carriers 23 whereby the carriers raise to the dot and dash line position of FIG. 1 results in approximately 360° of rotary movement in each direction. After the support 25 and carriers 23 reach maximum height and maximum rotational amplitude the operator will, by properly timed and proportioned manipulation of switch 92, reduce the angular amplitude of movement of column 13 in each direction to whatever degree is necessary to maintain full swinging movement of support 25 and carriers 23.

A normally closed switch indicated at 120 in FIG. 1 and in the wiring diagram is positioned so as to be engaged by the inner end of arm 31 when the annular support 25 reaches a predetermined upper limit of movement. Such engagement opens switch 120 and interrupts power to the cylinders 58. Preferably switch 120 includes a time-delay relay 121 so that the interruption is for only a brief time period during which the support 25 will return to its normal and desired range of operation.

The foregoing control of the swinging and consequent raising and lowering of the passenger carriers is effectuated with selector switch 94 in the position illustrated in FIG. 6. If now the operator reverses switch 94 to engage contact 95 which is in series with the contacts of programmer switch 88, then the control through switch 92 will be the same as heretofore excepting that each time the switch 88 operates to momentarily close the contacts the circuit of solenoid 59 or 60, as the case may be, will be closed only momentarily.

This momentarily moves four-way valve 58 from neutral position in whichever direction is dictated by the position of switch 92. Therefore the oscillation of column 13 and drum 16 moves in short step by step increments in time with the rhythm or cadence of the music from the sound recorder. This intermittent drum rotation produces a slight up or down impulse in the annular support 25 and passenger carriers 23 due to a momentary increase or decrease in the winding or unwinding action of the cables 37. Thus a very novel dance-like sensation, in time with the music is experienced by the passengers.

The following technique may be employed by the operator in bringing the ride quickly to a halt. When carriers 23 and support 25 are in an up or raised position and are about to reverse their movement and begin a down swing, the control switch 92 is set to move the drum 16 in the same direction as such down swing so that the down swing is not impeded by the drum and the cables unwind without resistance from the drum.

When bottom dead center is reached and carriers 23 and support 25 begin an up swing the operator reverses control switch 92 to move drum 16 against the upwind movement, thus exerting a stopping force. When the support 25 and the carriers have again about dissipated their momentum by rising movement against the resistance of the reversely moving drum, the operator again reverses the control switch 92 so that the drum 16 allows the carriers to reverse their movement and lower partially while unwinding is not impeded by the drum 16.

As the support 25 and the carriers 23 pass bottom dead center in this swing the switch 92 is again reversed to actuate the drum in a direction counter to the movement of support 25 until the support has again dissipated its momentum in this direction and the operator again reverses switch 92 and valve 58. Thus during this deceleration period the drum 16 works against upwinding forces of support 25 and allows free unwinding action. This procedure effectively damps the swinging action and brings the support 25 and the carriers quickly to bottom dead center rest position.

Previously herein brief reference was had to the light change system indicated schematically at 106 in FIG. 6. The assembly designated 106 in FIG. 6 may comprise what is well known in the electromechanical arts as a four-pole single throw ratchet relay wherein the input impulses operate a solenoid which progressively advances a ratchet mechanism which in turn actuates a drum or rotary switch through a series of circuit closing positions.

In the present instance the relay 106 controls four output circuits designated 125, 126, 127 and 128, each of which includes a string of lamps, the individual lamps of each output circuit being of the same color while each circuit as a whole has differently colored lamps from the other circuits. Thus the progressive and alternating energization of the four circuits produces a periodically changing color of illumination which periodic changes are synchronized with music from the tape recorder 85 by reason of the operation of the programmer 86.

I claim:

1. In an amusement ride, a rotatable central upright column, a winding drum fixed coaxially to the upper portion of said column, an annular passenger support disposed coaxially with respect to said column, a central bearing freely rotatable relative to said column, arm means radiating from said central bearing and pivoted thereto at their inner ends, and means connecting the outer ends of said arm means to said annular support for joint up and down movement, said arm means including a portion disposed approximately at the elevation of said drum when said arm means is in its lower position, cable means extending radially generally horizontally from said portion of said arm means to said winding drum whereby relative rotation of the assembly of said annular support and said arm means relative to said drum causes winding or unwinding of said cable means on said drum and consequent raising or lowering movement of said annular support, said assembly and said central bearing thereof being freely rotatable excepting for said cable means connection, power means for oscillating said central upright column, and manual means for selectively controlling the direction, timing and angular degree of oscillation of said column.

2. Apparatus according to claim 1 wherein said arm means portion is disposed substantially at the elevation of the lower end of said drum when the arm means is in its lower position whereby rotation of said drum and consequent raising of said arm means and annular support winds said cable means upwardly on said drum.

3. In an amusement ride, a central upright member mounted for rotation on a generally vertical axis, a winding drum fixed coaxially to an upper portion thereof, power means for oscillating said upright member in opposition directions, annular passenger carrier means disposed coaxially with respect to said upright member and mounted for free rotation relative thereto, cable means extending from said winding drum to said passenger carrier means whereby driving oscillation of said drum imparts rotational torque to said passenger carrier means and inertia forces cause said cable means to wind and unwind with respect to said drum to raise and lower said carrier means in conjunction with oscillation thereof, a rotatable annular inertia flywheel member of the general diametral extent of said passenger carrier means and disposed therebeneath, means restraining said inertia member against movement in an axial direction and means connecting said inertia member with said passenger carrier means for rotation therewith.

4. In an amusement ride, a central upright member mounted for rotation on a generally vertical axis, a winding drum fixed coaxially to an upper portion thereof, power means for oscillating said upright member in opposite directions, annular passenger carrier means disposed coaxially with respect to said upright member and

mounted for free rotation relative thereto; cable means extending from said winding drum to said passanger carrier means whereby driving oscillation of said drum imparts rotational torque to said passenger carrier means and inertia forces cause said cable means to wind and unwind with respect to said drum to raise and lower said carrier means in conjunction with oscillation thereof, a rotatable annular inertia flywheel member disposed beneath said passenger carrier means, means restraining said inertia member against movement in an axial direction and means connecting said inertia member with said passenger carrier means for rotation therewith.

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