T. BOLDIZZONI.

AMUSEMENT APPARATUS.

APPLICATION FILED JUNE 11, 1921.

1,409,279. Patented Mar. 14, 1922.

2 SHEETS—SHEET 1.

Fig. 1

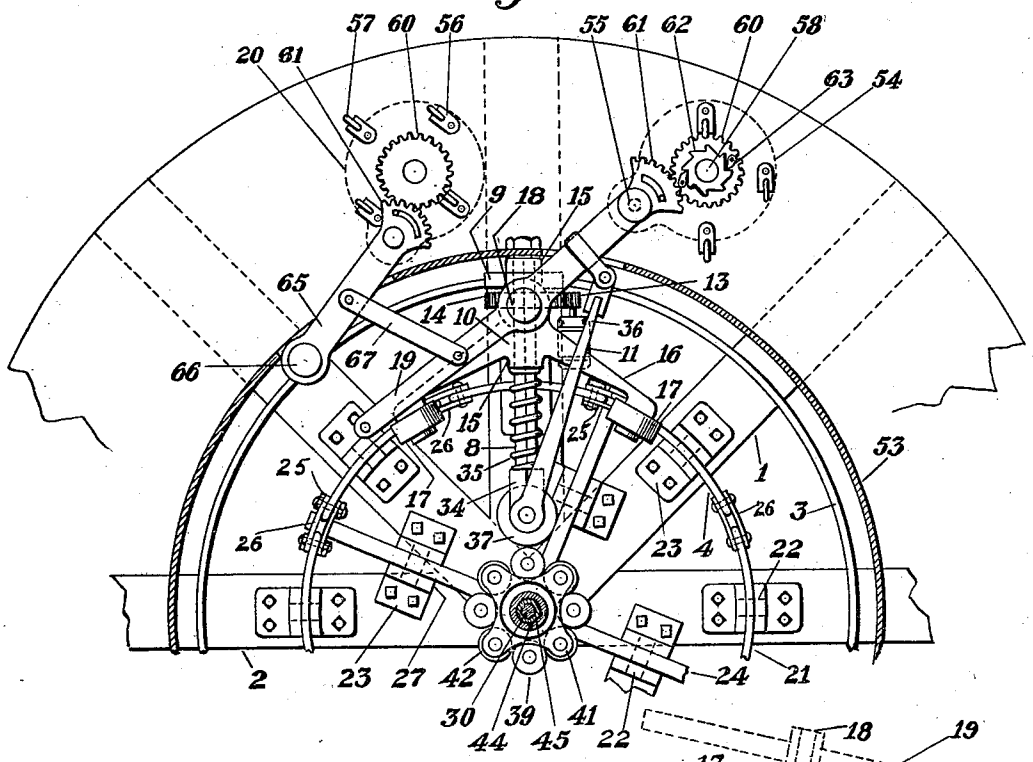


Fig. 2

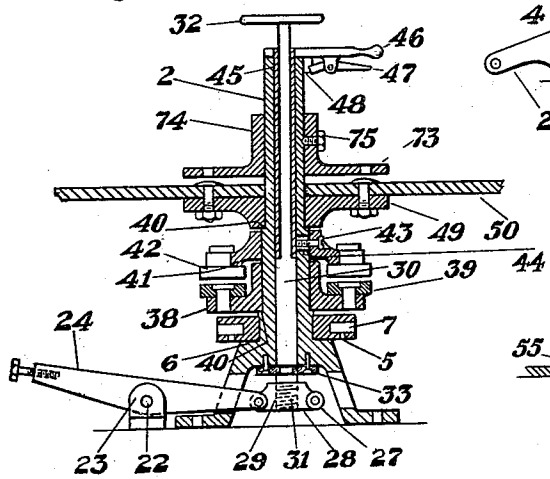


Fig. 3

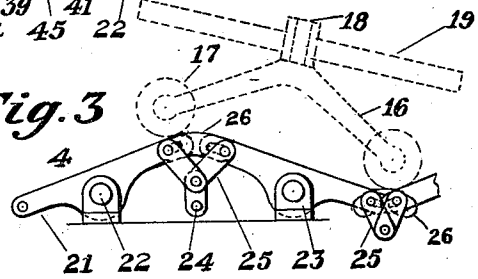
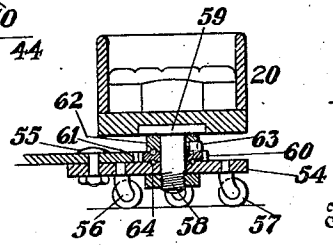


Fig. 8



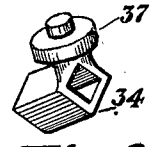


Fig. 9

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2 SHEETS—SHEET 2.

Fig. 4

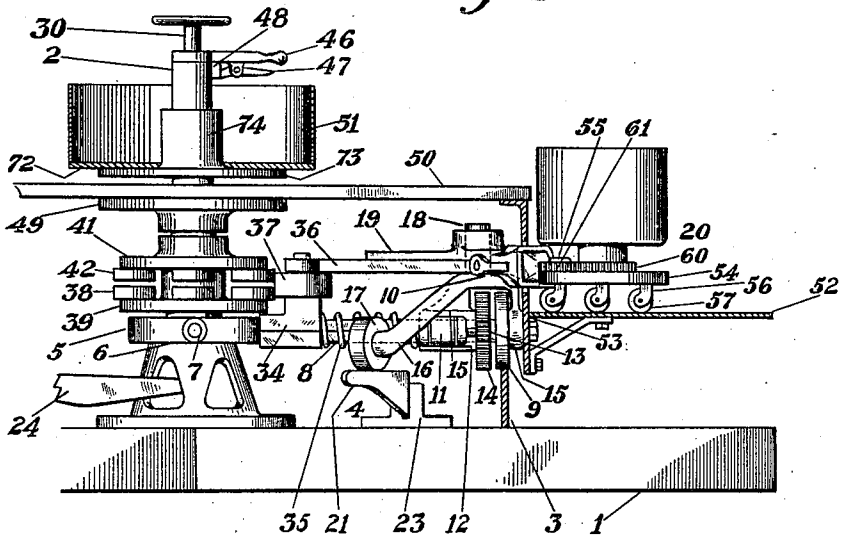


Fig. 5

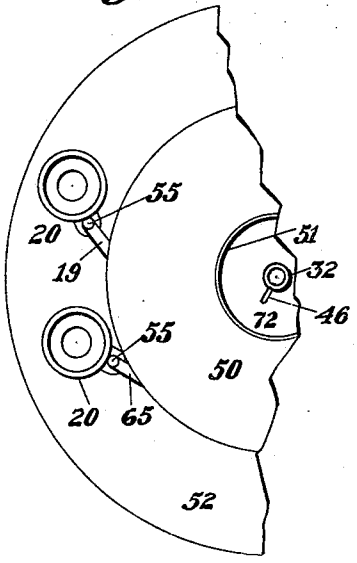


Fig. 6

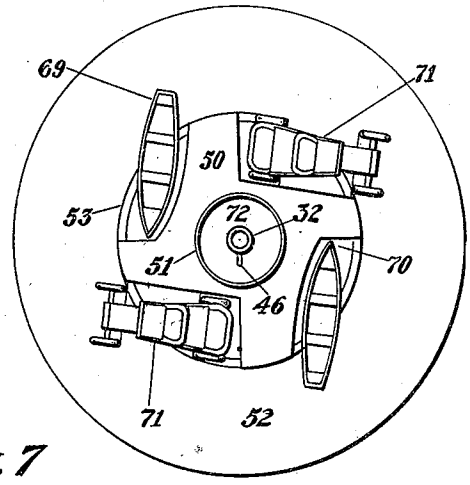
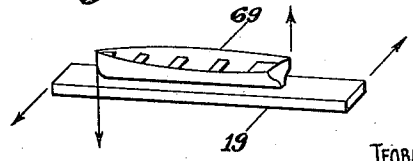


Fig. 7



Inventor

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By his Attorney

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UNITED STATES PATENT OFFICE.

TEOBALDO BOLDIZZONI, OF NEW YORK, N. Y.

AMUSEMENT APPARATUS.

1,409,279. Specification of Letters Patent. Patented Mar. 14, 1922.

Application filed June 11, 1921. Serial No. 476,851.

To all whom it may concern:

Be it known that I, TEOBALDO BOLDIZZONI, a subject of the King of Italy, residing in New York, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Amusement Apparatus, of which the following is a specification.

This invention relates to improvements in amusement apparatus, especially amusement apparatus to be set up in parks and other places; for the purpose of giving patrons a ride in a conveyance to which unusual movements are imparted; for the sake of the sensation thus produced.

An object of this invention is to provide an amusement apparatus which comprises a number of carriages mounted to revolve bodily around a central axis in engagement with tracks or rails encircling said axis; with conveyances in which passengers are to be seated supported upon or coupled to said carriages; one of said tracks being so constructed that it can be made to present a level or undulatory top; so that each carriage can be rocked as it revolves around said axis or made to revolve, without rocking, at will.

A further object of this invention is to provide an amusement apparatus comprising beams or members which can be caused to revolve bodily around a central axis and made to oscillate from side to side while the movement of revolution is in progress; the extent and frequency of said oscillatory movements being adjustable so that the motion of cars or conveyances coupled to said beams can be correspondingly varied.

These and other objects and advantages of the invention will be clear from following the description, taken with the accompanying drawings; which show the best embodiment of my invention now known to me; and the novel features of my invention are pointed out in the appended claims. This specification however is explanatory only and I may vary the shape, size and arrangement of the parts of the apparatus shown herein to the full extent indicated by the general meanings of the terms in which the claims are expressed.

On the drawings:

Figure 1 is a top plan of the mechanism of an amusement apparatus according to my invention.

Figure 2 shows in longitudinal section the central standard thereof.

Figure 3 is a view showing parts of an adjustable track utilized in the practice of my invention.

Figure 4 is a view of part of the apparatus showing particularly a revolving carriage included in same.

Figure 5 is a top view showing how the apparatus will appear when set up in readiness for operation; and

Figure 6 is a top view of the apparatus set up for operation and use in a different manner.

Figure 7 shows diagrammatically the full movement given by the principal parts of the apparatus.

Figure 8 shows one of the conveyances thereof; and

Figure 9 presents an isometric view of a detail.

The same numerals identify the same parts throughout.

A number of base members are indicated at 1; the same being arranged to extend or radiate outward from a common centre at which is a central supporting standard 2 which rests upon the inner end of the members 1, and about which the important parts of the apparatus must revolve. The members also support the outer rail 3 and inner rail 4, which encircle the standard 2, the outer rail having a straight or level top, while the inner rail is adjustable and can be caused to present either a straight or level top, or an uneven or undulatory top, as desired. The standard 2 carries near its lower end, and above the base thereof a rotary head 5 which rests upon a shoulder 6 of the standard, and this head is provided with a number of radially extending sockets or bearings 7, which receive the inner ends of a number of shafts 8.

These shafts are fixed at their inner ends in the sockets 7 and do not turn therein, although they may revolve bodily with the head 5 around the standard when the apparatus is in operation. On the outer ends of these shafts are mounted wheels 9, which rest upon the outer rails 3 and maintain the shafts out of engagement with the rail 4. These wheels can turn freely on the shafts 8 and by making wheels 9 rotate, the shafts 8 and head 5 can be caused to revolve about

the standard 2 as an axis. Adjacent the wheels 9, each of the shafts 8 mounts a carriage 10, which bears an electric motor 11, attached to a support 12 on the carriage 10. The gear 13 on the shaft of this motor may mesh with another gear 14, encircling each shaft 8, and rigid with the wheel 9 thereon, hence when the motors revolve, the wheels 9 are turned and the shafts 8 and the head 5 revolve about the standard 2 by reason of the driving effect of the wheels 9 engaging the outer rail 3.

The carriage 10 pivotally mounted on each shaft or part 8 has a pair of bearings 15, both of which receive the outer end of shaft 8 and between which the wheels 9 and gears 14 are located. Each carriage also has a pair of legs 16, which flank the inner bearing 15 and have on their outer ends rollers or wheels 17 which rest upon the top of the inner rail 4, so that the carriage engages with the rail 4 at a plurality of points. On top of each carriage 10 is an upstanding or substantially vertical journal or pivot 18 which engages a rocking beam or member 19; and to the outer end of each beam 19 may be coupled a conveyance or car 20 to receive passengers. The legs and other parts of the carriage are all substantially and in effect rigid with one another.

The inner rail 4 is of a special design and constitutes one of the important parts of my invention. It is made up of a number of movable sections 21, in the form of beams mounted adjacent their midpoints on pivots or journals 22, supported by bearings 23 on the base members. When these sections are manipulated so as to be in horizontal position with their upper faces in line, the top of the rail 4 will be plane or level throughout, but when the sections are adjusted so as to elevate them at one end and depress them at the other, the rail 4 will be undulatory and is then capable of causing the legs 16 of the carriages 10 to move up and down and oscillate or rock the carriages around shafts 8 as axes as the carriages travel on the two rails. See especially Figure 3. For the purpose of adjusting the sections of the inner rail or track 4, I provide members or levers 24 in line with the adjacent ends of each pair of sections and connected to each of said ends by a link 25. The end of the sections 21 must be connected by links 26, which are more or less curved on their upper edges at its top face; so that, whether the track 4 is level or undulatory, no spaces between the adjacent ends of any two of the sections 21 will exist. The levers are mounted on pivots similar to the pivots 22, carried by bearings similar to the bearings 23, but located inside of the inner rail 4, and at their inner ends the levers extend into openings in the base of the standard 2 and are pinned to lugs 27 carried by a member or head 28. This head has a threaded central bore 29, and the standard 2, which is hollow, has on the inside thereof a longitudinally extending shaft 30. The lower end of this shaft is threaded as shown at 31, and this end engages the bore 29 of the head 28. The other end of the shaft projects above the top of the standard and bears a fixed wheel 32 by which the shaft can be turned to move the head up and down and thus raise or lower the inner ends of the levers 24. Any suitable means such as fixed keys 33 on the bottom of the standard 2, to engage a groove in the shaft 30 may be employed to prevent the shaft from moving up and down while allowing it to be turned freely.

Hence the operator by grasping the wheel 32, can turn the shaft 30 and thus cause the head 28 to move up or down when he desires to adjust the inner rail 4. Whether the head 28 be raised or lowered the sections 21 remain in the positions which are given to them when the apparatus is put in operation; and as motors revolve, the shafts 8 and head 5, the wheels 17, which are about as far apart as the length of one of the sections 21, roll along the top of the inner rail 4 and thus rock the carriages 10 and the beams 19 on top of same. The shafts 8 constitute pivots for supporting the carriages 10, each pivot extending transversely of the track 4, and each carriage engages the track 4 to the front and rear of the carriage, at the points where the rollers 17 are located. Track 4 may be regarded as supporting one side of the carriage and track 3 the other side through the roller 9 and shaft 8. Of course the levers 24 are set before the operation of the apparatus begins; as they cannot be adjusted to change the top of the track 4 when the carriages 10 are moving. Of course the links 26 are so secured to the sections 21 that the links may slide a little on the ends of the sections as they are moved up or down; as by employing a pin-and-slot connection of these parts.

The links 26 join all the sections 21 at their ends, thus making as many junctions as there are sections, while the arms or levers 24 are located at each alternate junction of the sections 21. There may be two links 26 at each junction, one on the inner face and the other on the outer face of the track 4, as shown in Figure 1; though only one such link at each junction is indicated in Figure 3. The sections 21 may bear fixed pins and the links 26 slots to unite the sections 21 at their ends; and where the members 24 are placed, the links 25 are shown as attached to the ends of the links 26 by the same pins as are carried by the sections 21 to engage the slots of the links 26.

I also provide for giving each of the rocking beans 10 an oscillatory movement on the journals 18. For this purpose I mount on

each of the shafts 8 a slidable element or sleeve 34 between the head 5 and the carriage; and a spring 35 between the carriages 10 and the sleeve 34 normally forces this sleeve towards the standard 2. Each sleeve will be connected by a link 36 to the adjacent rocking beam 19; suitable parts being employed to unite the link to the beam at one end and the sleeve at the other.

The shafts 8 may be squared along the portions of the lengths thereof which are engaged by the sleeves 34 so that the sleeves can slide but cannot turn on these shafts, and on the top of each sleeve is mounted on a suitable pivot or journal a friction roller 37. Encircling the standard 2, at the level of the rollers 37 is a collar 38 carrying a number of rollers 39. This collar rests upon a shoulder 40 on the standard 2 just above the head 5, and is held stationary on the standard; hence it does not interfere with the rotation of the head 5. Above the collar 39 is a second collar 41 having the same number of anti-friction rollers 42. This second collar 41 is adjustable above the standard 2, which it encircles loosely; and carried by this collar is a pin 43 which projects through a circumferential slot 44 in the side of the standard and is made fast on its inner end to a tubular shaft 45 inside the standard and enveloping shaft 30. This shaft 45 extends upward beyond the top of the standard, and to its upper ends is fixed an adjusting lever 46. This lever has a pivoted catch 47 which enables it to engage rack teeth 48 on the outside of the standard to hold the lever, and therefore the shaft 45, together with the collar 41, in any desired position.

Hence, when the motors 11 revolve the wheels 9 and cause the carriages 10 to move on the rails 3 and 4 around the standard 2, not only may the carriages be oscillated to rock the beams 19 about the shafts 8, but also the rollers 37 as they successively engage with the rollers 39 and 42, will impart a reciprocatory movement to the sleeves 34. Hence the sleeves serve as operating elements to actuate the beams 19. The rollers 37 will be of sufficient thickness to engage both the rollers 39 and rollers 42, although the rollers 42 are a little above the rollers 39. As the sleeves are moved outward by the rollers 37, and inward by the springs 36, when the rollers 37 are between the rollers on the collars, the links 35 are pushed and pulled to oscillate the beams 19 on the journals 18, as will be understood. When the lever 46 is manipulated to turn the upper collar 41, the rollers 42 can be brought into alinement with the rollers 39; then the space between successive rollers engaged by the roller 37 will be greater and the range of movement of the sleeves 34 will be longer. Therefore the oscillation of the beams 19 on the journals 18 will be wider and longer. But by turning the shaft 45 to move the rollers 42 over the spaces between rollers 39, the movement of the sleeves 34 will be increased in number for each revolution above the standard 2, and will be made shorter and quicker, with a corresponding change in the oscillations of the beams 19.

The slot 44 is indicated most clearly in Figure 1, which shows the standard in cross section about at the level of the upper collar 41.

I provide the standard 2 near the top thereof with another shoulder 40, upon which may rest a bearing plate 49 constituting the centre of the floor or platform 50. This platform covers the mechanism of the amusement apparatus; extending from the standard out beyond the ends of the carriages 10; and it may be provided with a circular wall or enclosure 51 surrounding the upper end of the standard for the convenience of the operator who stands on this platform and manipulates the wheel 32 and the lever 46. Beyond the platform 50 is a lower stage or platform 52 connected to the platform 51 by means of a web 53, and the outer ends of the shafts 8 may engage openings in this web; so that, when the carriages 10 revolve the two platforms 50 and 52 may likewise turn about the standard 2. The beams 19 may have their inner ends under the central platform 50, and just a little below the bottom of same, while their opposite ends project beyond the circumference of the platform 50 and extend out above the upper surface of the platform 52.

Openings of sufficient size to give clearance to the beams 19 may be provided in the web 53; and any suitable way of joining the floors 52 and 50 together; as by flanging the upper edge of the web 53 to unite it to the floor 50 and using brace or angle irons to connect the lower edge of the web 53 to the floor 52 may be adopted.

The platform 52 may support a number of trucks 54, coupled to the outer ends of beams 19 by pins 55. These trucks 54 will have casters 56 attached to their lower faces, the casters including rollers 57, so that the trucks may move about on the platform 52. At the middle of each truck will be an opening to receive a journal 58 extending from the bottom plate 59, which supports the car 20. This car may have any preferred shape, with longitudinal or transverse seats, or it may be round with a ring of seats as shown, for instance in Figure 5. Encircling each journal 58 is a loose gear; see Figure 8, presenting a car in section; this gear lying between the bottom plate 59 and the truck 54. This gear 60 is engaged by a segmental rack 61 on the end of the beam 19 and it carries a pair of pawls 62 to engage a ratchet wheel 63 fast to the journal 58, below the bottom plate 59. Ball bearings for the upper and

lower faces of the gear 60 are shown at 64. A nut on the lower end of the journal, which is threaded, holds the truck and car together.

Between each pair of rock beams 19 I may place an arm 65, securing it to a pivot or journal 66, which may project from the lower face of the floor 50 or the upper face of the platform 52 near the circumference thereof. These arms extend outward above the stage 52 and between their pivoted and free ends they are joined by links 67 to the beams 19. The outer ends of these arms 65 are also coupled to cars 20 and carry at their outer ends racks similar to the racks 61 above mentioned. These cars 20 may be of the same construction as the ones attached to the beams 19, or the pawls 62 and ratchets 63 may be omitted; and the gears 60 may be made rigid with the journals 58. In such a case only a single ball bearing 64, between the gear 60 and the truck 54 will be necessary. When the arms 65 swing on their pivots the teeth of the racks 61 will oscillate the cars 20 coupled to the arms 65 in both directions on journals 58 as axes; while the same movement of the beams 19 on the journals 18 will cause the teeth of the racks 61 at the outer end of these beams to act upon the loose gears 60, in such manner that the pawls 62 will turn ratchets 63 intermittently; hence the gears at the outer ends of the beams 19 will revolve or spin always in the same direction, but this revolving movement will not be continuous or constant, but uneven and jerky.

Figure 1 shows only a single arm 65 and a single beam 19, with cars in outline attached, but as the apparatus is illustrated, there will be four such arms and beams, as will be understood; or another number may be adopted if preferred.

In operation, with the cars 20 coupled to both the beams 19 and the arms 65, the wheel 32 is turned as to make top of the inner rail perfectly level. Then, when the current is turned on and motors 11 revolve, the wheels 9 and the other parts, such as the shafts 8, the rails, the standard, the head 5, etc., for enabling the carriages to revolve about the central axis, co-operate to move the carriages around the standard 2 on the tracks 3 and 4 and the only motion given to the beams 19 and the arms 65 will be an oscillatory motion on their pivots. Of course openings are also provided in the web 53 to give clearance to the arms 65. The carriages at this time are not rocked with the shafts 8, but the cars 20 will be pulled about and the oscillation of the beams 19 and arms 65 by the parts for moving sleeves 34, as the rollers 37 and springs 35, as they revolve around the standard 2 will throw or jerk the trucks 54 with the cars 20 thereon, back and forth and at the same time give to the cars 20 the rotary movements upon the journal 58 of each as an axis; this movement for the cars attached to the arms 65 being around in one direction and back in the opposite direction, and in the case of the remaining cars around in the same direction intermittently as above stated.

If it is desired to utilize the rocking movement of the beams 19 in addition to their oscillatory movement about the journals 18, the trucks 54 may be detached or uncoupled from the outer ends of these beams and a structure resembling a boat for example may be secured to the tops of the rocking beams 19. In such case the upper platform 50 may be formed so as to provide spaces to receive one end of the boat, the boats being indicated at 69 and the spaces at 70 on Figure 7. Then before the current is turned on for the motors 11 the operator can turn the wheel 32 so as to move the shaft 30 and operate the inner ends of the levers 34. Hence the links 35 will depress one end of each section 21 and elevate the other end, so as to make the track 4 consist of elevations and depressions and thus rock the carriages 10. The boat 69 will therefore be rocked from side to side, and at the same time the bow and stern will be swung in and out towards the standard 2 as indicated in Figure 7. At this time the trucks 54 and the cars 20 attached to the ends of arms 65 may remain in service if desired, and they may be arranged so that they will oscillate in both directions as shown, or intermittently in one direction the same as the trucks and cars attached to the beams 19 in Figure 5, or some in one way and some in another. The links 67 may engage loosely the pins which join them to the arms 65 and beams 19, so that when the beams 19 rock with the carriages 10 and oscillate on their pivots 18 at the same time, they may still operate the arms 65. As is understood the shafts 8 are not affected by the track 4; since the shafts 8 do not rock but revolve only about the standard 2, being fixed at their inner ends to the head 5.

Of course arms 65 may be omitted together, with the trucks 54 and cars 20 coupled to same, when the rocking beams 19 carry the boats 69, or they may be usel in combination with such boats; but when boats are employed the cars and trucks at the ends of the beams 19 cannot be utilized.

The spaces 70 may be closed by movable sections, not shown, when the boats 69 are not in service and only cars and trucks attached to the outer ends of both beams 19 and arms 65 are in service.

Of course the shaft 30 may also be provided with a catch similar to catch 47 to engage the rack teeth on standard 2 and thus hold shaft 30 securely and make the

sections 21 of the rail 4 maintain any position given them; if such a catch is required.

I have also found that by disconnecting the levers 24 from the sections 21, leaving the ends of the sections joined by the connecting elements 26, the carriages 10 will receive a rocking movement by virtue of the fact that the rollers 16 as they pass over the sections, will force the ends of the sections to move up and down as the weight of the carriage falls to one side or the other of the pivots 22, and the track 4 can be used accordingly, if desired. This action is due to the rollers 17 being as far apart as the length of one section 21.

Figure 5 shows how the apparatus will look when viewed from above; this Figure showing the apparatus in top plan with two cars supported on the lower floor 52, as in Figure 1; only half the apparatus being presented for purposes of explanation.

If desired, instead of mounting only conveyances resembling boats on the beams 19, one or more conveyances resembling automobiles may also be used, as indicated in Figure 6, this view being like Figure 5, showing the apparatus in top plan, but with boats and automobiles in alteration, and without any cars 20 on the lower floor 52. The conveyances resembling automobiles indicated at 71 may be supported by affixing cross bars to the beams 19. The motions given to the boats or imitation automobiles by the beams 19 when the beams rock the carriages 10 and are also oscillated about the pivots 18 are indicated in Figure 7, where the vertical arrows show the rocking motion given by the carriage 10 and the horizontal arrows show the oscillating motion imparted by the link 25.

The wall 51 may be supported on a base 72 resting upon a collar 73 having hub 74 secured by a fastening bolt 75 to the standard 2 just above the upper platform 50. With such a construction the attendant is enabled to remain at the standard 2 when the apparatus is in operation and manipulate the lever 46 so as to adjust the parts for varying the oscillation of the beams 19 while the ride is in progress; the base 72 and wall 51 being stationary because they are fixed to the standard and do not revolve with the platforms 50 and 52 under them.

To supply current to the motors 11, any suitable arrangement of fixed and movable contacts may be employed.

Having described my invention, what I believe to be new and desire to secure and protect by Letters Patent of the United States is:—

1. The combination of a carriage, an adjustable track to be engaged by the carriage a part for pivotally mounting the carriage, said part and said carriage being supported to revolve together about an axis, said part being maintained out of engagement with the track, said track in one position of adjustment presenting an undulatory top to enable the carriage to rock on said part without affecting said part, as the carriage travels on the track, and in another position of adjustment presenting an even top to enable the carriage to travel without such rocking movement.

2. The combination of a carriage consisting of parts all substantially rigid with one another, a track having a straight top to support one side of the carriage and a track having an undulatory top to support the other side of the carriage whereby the carriage will be given a rocking movement as it travels on said tracks.

3. An undulatory track comprising a plurality of sections pivotally mounted adjacent their midpoints and arranged end to end with their extremities connected, levers joined to said sections, said levers being connected together, and a member for operating said levers simultaneously to adjust said sections.

4. The combination of a member mounted to oscillate, an element to impart oscillatory movements to said member, and adjustable parts for successively engaging said element and varying the oscillations of said member.

5. The combination of a member, a substantially vertical pivot for oscillatably mounting said member, a part for supporting said member and said pivot to revolve bodily about an axis, an element movably mounted on said part to actuate said member, and parts to operate said element for continuously oscillating said member as it revolves about said axis.

6. The combination of a member mounted to oscillate, a movable operating element, a link connecting said element to said member, a shaft on which said element is mounted, a spring for moving the element in one direction, and a plurality of rollers spaced apart and acting successively to push the element in the opposite direction, whereby said member will be oscillated.

7. The combination of an oscillatable member, a truck pivotally coupled to the end of said member, a car rotatably carried by the truck, and connections between the end of the member and the car to move the car on the truck when said member oscillates.

8. The combination of an oscillatable member, a truck pivotally coupled to one end of said member, a car rotatably mounted on the truck, and connections between the member and the car for oscillating the car on the truck as the member oscillates.

9. The combination of a shaft mounted to revolve about an axis at one end, a carriage mounted on the shaft at the opposite end, a

member mounted on the carriage to oscillate about a pivot, an undulatory track to rock the carriage as the carriage and shaft revolve, an operating element on the shaft, a link connecting the element and the member, and parts comprising rollers spaced apart about said axis to actuate the element and oscillate said member as the carriage revolves and rocks in its revolving movement about said axis.

10. The combination of a shaft mounted to revolve about an axis at one end, a carriage supported on the shaft at the opposite end, a member pivotally mounted on the carriage, an operating element mounted to move on the shaft, a link connecting the element and the member, an undulatory track to rock the carriage as it revolves, and parts comprising rollers to actuate the element and oscillate the member as the carriage revolves about said axis and rocks on the shaft, some of said rollers being adjustable to vary the extent and frequency of the oscillatory movement of the member.

11. The combination of a shaft mounted to revolve about an axis at one end, a carriage mounted upon the opposite end of the shaft to revolve therewith, an undulatory track to rock the carriage on said shaft as it revolves with same, a member pivotally mounted on the carriage, an operating element mounted to move on said shaft, a link connecting the element to the member, and parts comprising rollers spaced about said axis to actuate the element and oscillate the member in addition to the rocking movement given to it by the carriage, the track comprising pivoted sections arranged end to end, and a member with connections to said sections to vary the undulatory effect of the track, or make the top of said track perfectly level so as to prevent rocking movement of the carriage.

12. Amusement apparatus comprising an undulatory track, a carriage in engagement with the track, a part providing a pivot extending transversely of the track, the carriage being movably supported on said pivot to enable it to be rocked on the pivot by the track as the carriage travels on the track.

13. Amusement apparatus comprising an undulatory track, said track including a plurality of sections pivotally mounted between their ends and having their extremities connected, and a carriage to engage the track adjacent the front and rear of the carriage, to be rocked by said sections, the distance between the points of engagement of the carriage with the track being substantially equal to the length of each of said sections.

14. The combination of a movable carriage, a member on the carriage and movable relative thereto, an operating element for the member, and an undulatory track for the carriage, the carriage engaging the track at a plurality of points to be rocked by the track as it travels thereon, whereby the rocking movement of the carriage can be added to the movement of said member.

15. The combination of a movable carriage, a movable member on the carriage and means for moving said member relative thereto, and a track for the carriage shaped to rock the carriage as it travels, whereby the rocking movement of the carriage can be added to the movement of said member, and parts for regulating the movement of said member relative to said carriage.

16. The combination of a movable carriage, a movable member on the carriage and means for moving said member relative thereto, a track for the carriage adjustable to cause the carriage to rock as it travels and permit the rocking movement of the carriage to be added to the movement of said member, or to permit the carriage to travel without rocking, and parts for varying the movement of the member relative to the carriage.

17. Amusement apparatus comprising a central post, an endless track encircling said post, a carriage to run upon said track, the track being composed of sections arranged end to end, pivots between said ends for adjustably mounting the sections, and operating members disposed to engage the sections between said pivots to adjust the sections and make the track level or undulatory.

18. Amusement apparatus comprising a central post, an endless track encircling said post, a carriage to run on said track, the track being composed of sections arranged end to end, pivots between said ends for adjustably mounting the sections, and operating members disposed to engage said sections between the pivots to adjust the sections and make the track level or undulatory, said members being connected to be operated in unison.

In testimony whereof, I have signed my name to this specification this 31 day of May, 1921.

TEOBALDO BOLDIZZONI.