No. 831,366. PATENTED SEPT. 18, 1906.

H. S. MAXIM.

ROUNDABOUT.

APPLICATION FILED MAR. 14, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

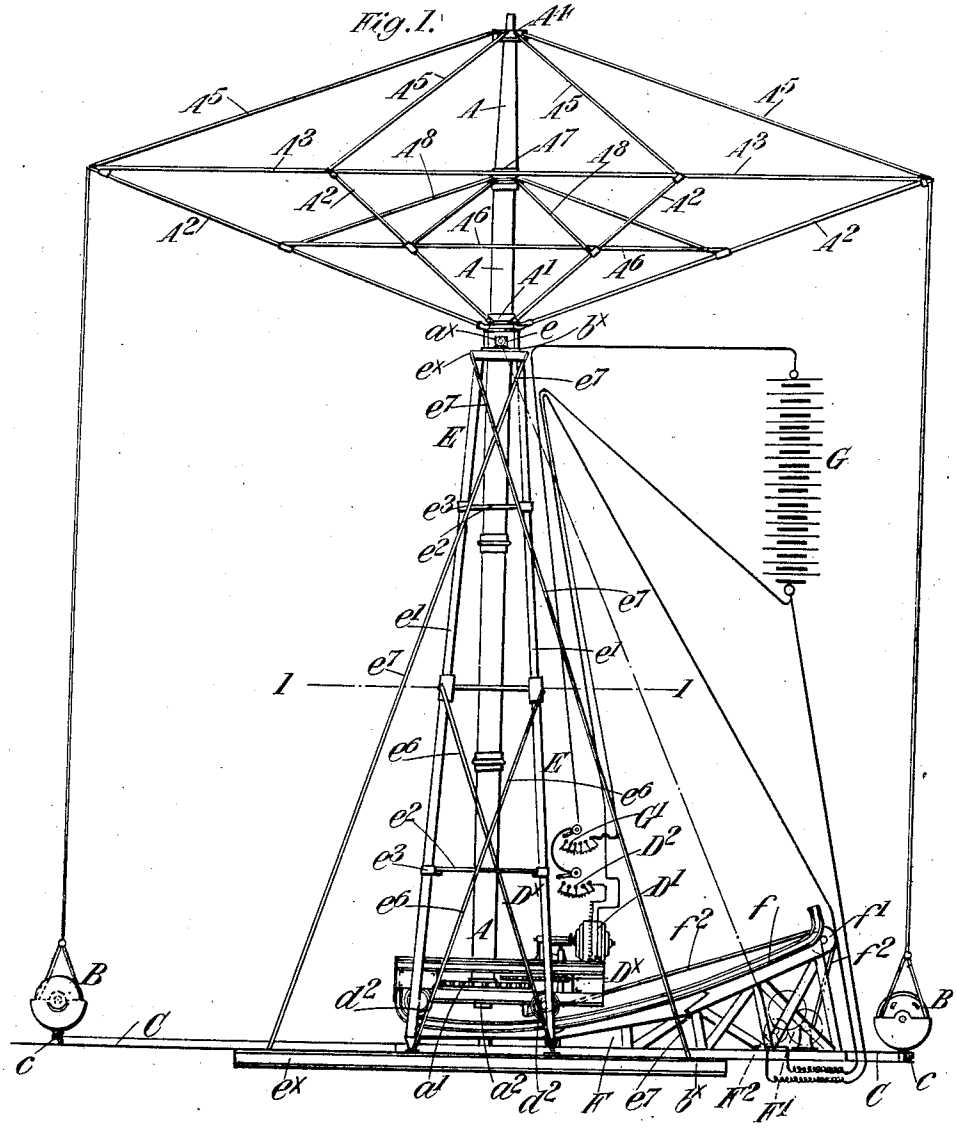
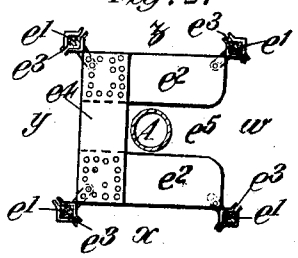


Fig. 2.



Witnesses:

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3 SHEETS—SHEET 2.

Fig. 3.

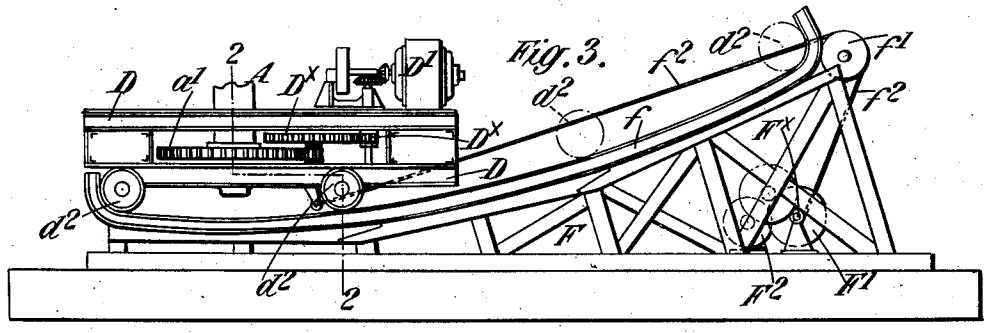


Fig. 4.

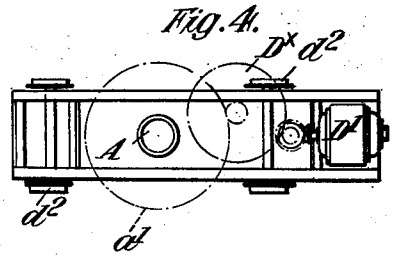
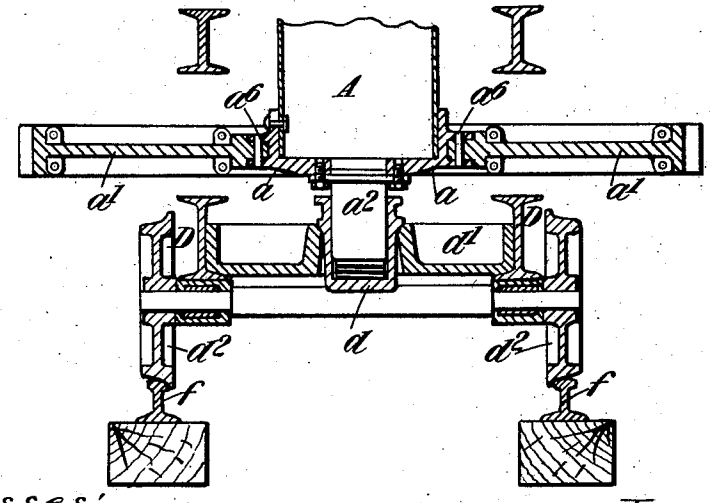


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

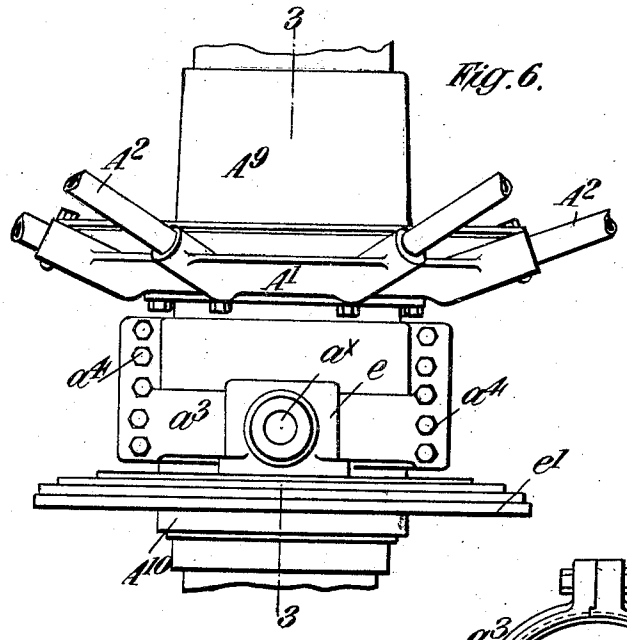


Fig. 8.

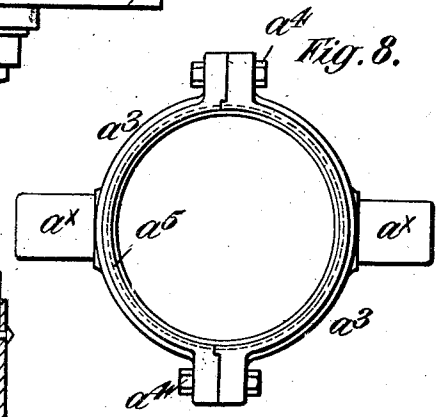
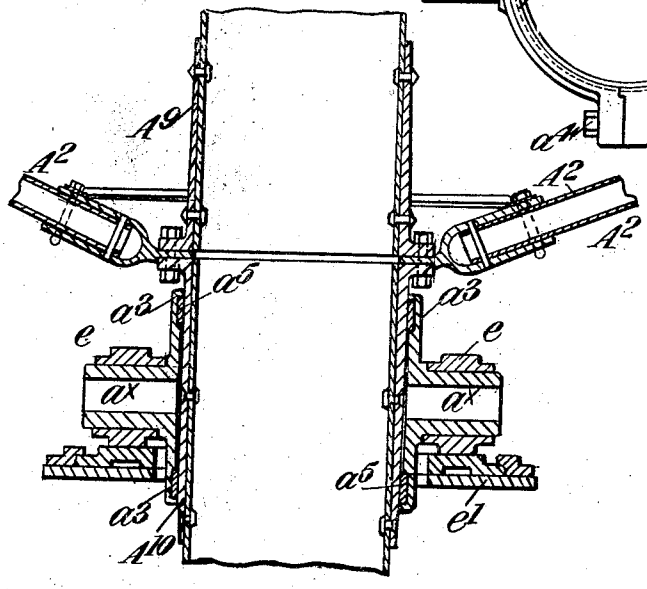


Fig. 7.



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UNITED STATES PATENT OFFICE.

HIRAM STEVENS MAXIM, OF WEST NORWOOD, SURREY, ENGLAND.

ROUNDABOUT.

No. 831,366. Specification of Letters Patent. Patented Sept. 18, 1906.

Application filed March 14, 1905. Serial No. 250,074.

To all whom it may concern:

Be it known that I, HIRAM STEVENS MAXIM, chevalier of the Legion of Honor, civil, mechanical, and electrical engineer, a subject of the King of Great Britain, residing at Thurlow Lodge, Norwood Road, West Norwood, in the county of Surrey, England, have invented certain new and useful Roundabouts, of which the following is a specification.

This invention relates to roundabouts and similar contrivances for public recreation, and has reference more particularly to the kind of contrivance or roundabout I have already devised and set forth in the specification of my prior United States patent, No. 804,147, dated November 7, 1905, in which there is a central rotary shaft driven by an appropriate motor or motors and having at or near its upper end a series of radial arms, from the free ends of which cars are suspended, so as to be able to move outward under centrifugal force when the shaft revolves.

In order to cause the cars to perform peculiar evolutions during their travel around the axis of the rotary shaft, I have already proposed to provide them with movable aeroplanes or to permanently arrange the rotary shaft at an angle. According to my present invention I obtain these peculiar evolutions by so arranging the rotary shaft that at the commencement of rotation of the cars it will occupy a vertical or approximately vertical position; but while the cars are still traveling and after they have been swung outward to a suitable extent the said shaft will be gradually tilted or shifted into an inclined position and then will be subsequently restored to its vertical or approximately vertical position before the cars are brought to rest.

In order that my said invention may be clearly understood and readily carried into effect, I will describe the same more fully with reference to the accompanying drawings, in which—

Figure 1 is a general elevation of the improved roundabout. Fig. 2 is a horizontal section taken approximately on the line 1 1 of Fig. 1, on an enlarged scale. Fig. 3 is a side elevation, Fig. 4 a plan, and Fig. 5 a cross-section, on the line 2 2, showing the lower portion of the roundabout and the means employed for shifting the rotary shaft from the vertical to the inclined position, and vice versa, Fig. 5 being drawn on a larger scale than Figs. 3 and 4. Fig. 6 is a side elevation, on a larger scale, showing the position of the rotary shaft and the bearing about which it tilts or turns in moving to and from its vertical position. Fig. 7 is a vertical section on the line 3 3 of Fig. 6, and Fig. 8 is a plan of the trunnion-ring which is secured to said rotary shaft.

A is the central rotary shaft.

B B are the suspended cars, of which there may be any appropriate number, and C is a circular landing-stage. As in my previous constructions of this kind of apparatus, I make the shaft A of mild steel in several tubular sections or lengths, bolted together or otherwise firmly secured together at their ends, the sections at the upper part of the said shaft gradually diminishing in diameter. The lower end of the shaft is also, as heretofore, provided with a flange a, Fig. 5, to which is bolted or otherwise connected a spur-wheel a' and a flanged foot-step a^2 of cast-steel, which is carried in a foot-step bearing d, mounted in a base-plate d', forming part of a trolley D.

E is an upright structure or tower which is made rather wide at the base and carries at its upper end bearings e for the reception of trunnions $a^\times$ $a^\times$ on the shaft to permit of its swiveling or tilting in a vertical plane. The said structure is built up of four upright beams e', tied together transversely at suitable intervals by iron plates e^2 e^2, which are connected with said uprights by clips e^3 at the outer corners of said plates. These plates are also joined together at the side remote from that in which the rotary shaft moves in turning about its trunnions by plates e^4, riveted thereto, Fig. 2. A lateral opening e^5 is thus left in the structure for the rotary shaft to pass through in performing its swinging or tilting movements. The said structure is furthermore strengthened by tie-rods e^6 e^7 on the three sides x y z. On the side w the rods e^6 are omitted, and the rods e^7 connect together the points $e^\times$ $e^\times$ and $b^\times$ $b^\times$, not $e^\times$ $b^\times$, as on the three sides x y z. Rigidly secured to the shaft A is a steel hub A', having sockets from which radiate the series of suspension-arms A^2, which are preferably made of steel tubes. The outer ends of said tubular radial arms are connected together by chordal stay-rods A^3 and are also connected with a flange A^4 at the upper end of the rotary shaft by stay-rods A^5. The said tubular radial arms are furthermore con-

nected together near their middle by chordal stay-rods A^6 and also with a flange A^7 on the rotary shaft by stay-rods A^8. The aforesaid trunnions $a^\times$ $a^\times$ are formed on a divided ring or bushing a^3, (see Figs. 6, 7, and 8,) which has flanges for the reception of bolts a^4, so that the divided ring or bushing may be bolted together around the shaft after the flanges A^9 and A^{10} have been riveted in position on the adjacent ends of the shaft. The said trunnions are carried in the bearings e, which are carried by a plate or block e', that is situated at the upper end of the structure E. Situated within turned recesses in the aforesaid divided ring or bushing are divided rings a^5, surrounding the rotary shaft and constituting bearing-surfaces for the shaft to revolve within, the weight of the shaft and parts carried thereby being supported by the foot-step bearing d, which is carried by the trolley D, as aforesaid.

The trolley D has four or other appropriate number of wheels d^2, adapted to travel on suitable rails or guideways f, carried by a structure F, the said rails being curved to correspond with an arc struck from the axis of the aforesaid trunnions. This trolley is adapted to be shifted on its rails or guideways by a windlass F', worked by an electric motor F^2, and in that way the rotary shaft is swung or tilted about its trunnions and caused to assume its inclined position. The motive power for actuating the gearing for revolving the shaft is preferably electric, in which case an electric motor D' is mounted on said trolley D and drives the spur-wheel a' of the shaft through suitable speed-reducing gearing $D^\times$. The electric current is supplied to the windlass-motor F^2 from a secondary battery or other source of electric supply G through a controlling-switch G', and the current for working the motor D' is supplied with current from the same source of supply through a switch D^2, these two switches being preferably arranged to be operated from the trolley D. The said switches may, however, be situated at some stationary point outside the apparatus.

The structure F, carrying the guide-rails, is built up of strong wooden beams, and the rails may be curved upwardly at their ends to act as stops for limiting the extent of movement of the trolley in either direction. The outer end of said structure has a guide-pulley f'', over which a wire rope f^2, connected with the trolley, passes to the winding-drum $f^\times$ of the windlass F'. Instead of operating the trolley by electric motors I may employ a hydraulic ram or any other appropriate kind of actuating machinery.

With the contrivance or roundabout constructed as above stated the passengers enter the cars from the platform or landing-stage C while the rotary shaft is in its vertical position, as shown by full lines in Fig. 1. The landing-stage or platform C is in the example illustrated situated on the ground and is protected by a guard-rail c, Fig. 1, as in my previous arrangements. After the passengers have entered the cars the shaft is set into motion by the motor D', and when the cars in traveling in their circular course have moved outwardly under centrifugal force to the desired extent the trolley is shifted laterally by the motor F^2 and windlass F' to bring the lower end of the shaft out of the vertical to the requisite extent, as shown by the dotted line in Fig. 1. Then after the cars have been permitted to revolve the desired length of time in their new course, due to this inclined position of the shaft, the said trolley is permitted to return to its original position by the action of gravity and the shaft thereby restored to the vertical prior to the stoppage of the roundabout. The cars are then permitted to descend inwardly as their speed diminishes and finally come to rest at the platform C to enable the passengers to alight, as in my previous arrangements.

By constructing the contrivance as above stated the cars will in their travel and while the shaft is in its inclined position be caused to apparently descend and remount a steep hill without the least shock, and if the contrivance be erected in proximity to or in a lake the cars can be caused in their descent to plunge into or graze the surface of the water as they reach the lowermost point in the circumference of the inclined circular path in which they travel.

In order to meet the improbable case of the motors or driving-gear becoming unexpectedly ineffective during their working, and thereby stopping the revolution of the rotary shaft with undesirable suddenness, I couple the lower part of the shaft to the spur-wheel a' by wooden pins a^6, Fig. 5, that in the event of the shaft being subjected to an extraordinary stress, such as that which would arise under the above-stated circumstances, will become severed or sheared, and thereby automatically render the shaft so far as its revolution is concerned independent of the driving-gear, thus permitting the cars to continue their course independently of the driving-gear and gradually come to rest.

It will of course be obvious that the platform C, from which the passengers enter the cars, may be elevated any suitable distance above the ground, as in my previous arrangements, instead of being situated directly on the ground, as represented in the drawings.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms and means for driving said rotary shaft; of a foot-step bearing for said rotary shaft a movable base or trolley supporting the foot-

step bearing and the driving-gear of said shaft, and means for shifting said trolley to and fro along a stationary curvilinear path for tilting the shaft during its revolution for the purpose specified.

2. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms and means for driving said rotary shaft; of a foot-step bearing for said rotary shaft a movable base or trolley supporting the foot-step bearing and the driving-gear of said shaft, horizontal trunnions on said shaft fixed bearings for said trunnions and means for shifting the trolley to and fro along a stationary curvilinear path for tilting the shaft about the horizontal trunnions during its revolution for the purpose specified.

3. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms and means for driving said rotary shaft; of a foot-step bearing for said rotary shaft a movable base or trolley supporting the foot-step bearing and the driving-gear of said shaft, an upright structure, bearings at the upper end of such structure, trunnions on the rotary shaft supported by said bearings, and means for shifting the trolley to and fro along a stationary curvilinear path for tilting the shaft about said trunnion-bearings during its revolution substantially as and for the purpose specified.

4. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms and means for driving said rotary shaft; of a foot-step bearing for said rotary shaft a movable base or trolley supporting the foot-step bearing and the driving-gear of said shaft, an upright structure open at one side and within which the shaft revolves when in its vertical position, bearings at the upper end of said structure, trunnions on the rotary shaft supported by said bearings, and means for shifting the trolley to and fro in a stationary curvilinear course for tilting the shaft about said trunnion-bearings during its revolution substantially as and for the purpose specified.

5. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms and means for driving said rotary shaft; of a foot-step bearing for said rotary shaft a movable base or trolley supporting the foot-step bearing and the driving-gear of the said shaft, an upright structure open at one side and within which the shaft revolves when in its vertical position, trunnion-bearings at the upper end of said structure, a divided ring embracing the shaft, trunnions formed on said divided ring and carried by said trunnion-bearings internal bearing-surfaces within said ring for the shaft to revolve against, and a windlass for shifting the said trolley in a stationary curvilinear course struck from the axis of the trunnions substantially as and for the purpose specified.

6. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms and driving-gear for said rotary shaft; of a foot-step bearing for said rotary shaft, a movable base or trolley supporting the foot-step bearing and the driving-gear of said shaft means for shifting said trolley to and fro for tilting the shaft during its revolution, and means for automatically rendering the rotary shaft independent of its driving-gear in the event of the latter becoming suddenly stopped substantially as described.

7. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms and means for driving said rotary shaft; of a foot-step bearing for said rotary shaft, a movable base or trolley supporting the foot-step bearing and the driving-gear of the said shaft, an upright structure open at one side and within which the shaft revolves when in its vertical position, trunnion-bearings at the upper end of said structure, a divided ring embracing the shaft, trunnions formed on said divided ring and carried by said trunnion-bearings, internal bearing-surfaces within said ring for the shaft to revolve against, stationary curved rails struck from the axis of the trunnions, wheels on the trolley running on said curved rails, stops for limiting the extent of the trolley's movement on said rails, and a windlass for moving said trolley on the rails, substantially as and for the purpose specified.

8. In a roundabout, the combination with an upright rotary shaft, radial arms carried thereby, cars freely suspended from said arms, and driving-gear from said rotary shaft; of a foot-step bearing for said rotary shaft, a movable base or trolley supporting the foot-step bearing and the driving-gear of said shaft, a gear-wheel situated at the lower end of said shaft and engaging with said driving-gear, shear-pins connecting said gear-wheel with said shaft, and means for shifting said trolley to and fro for tilting the shaft during its revolution, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 21st day of February, 1905.

HIRAM STEVENS MAXIM.

Witnesses:
T. SELBY WARDLE,
WALTER J. SKERTEN.