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(54) **NARROW BASE VIEWING WHEEL**

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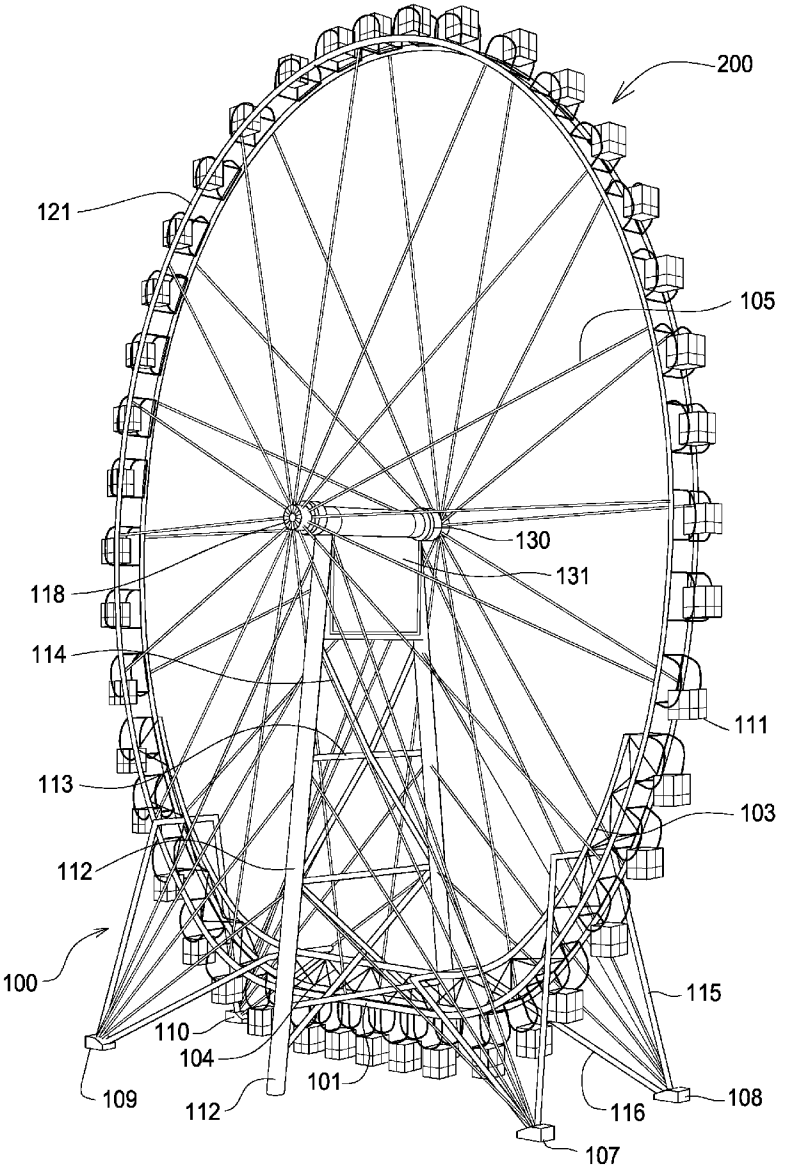
(52) **U.S. Cl.** **472/46**

(57) **ABSTRACT**

A wheel amusement ride is depicted, which moves carriages containing riders around the wheel on a track. In other words, the carriages move, not the wheel. This design allows a moment frame to be used to support the wheel. Because a moment frame can be constructed to be much narrower than the supports for a traditional Ferris wheel, the wheel of the present invention can be installed in a much narrower land area, while still achieving great height.



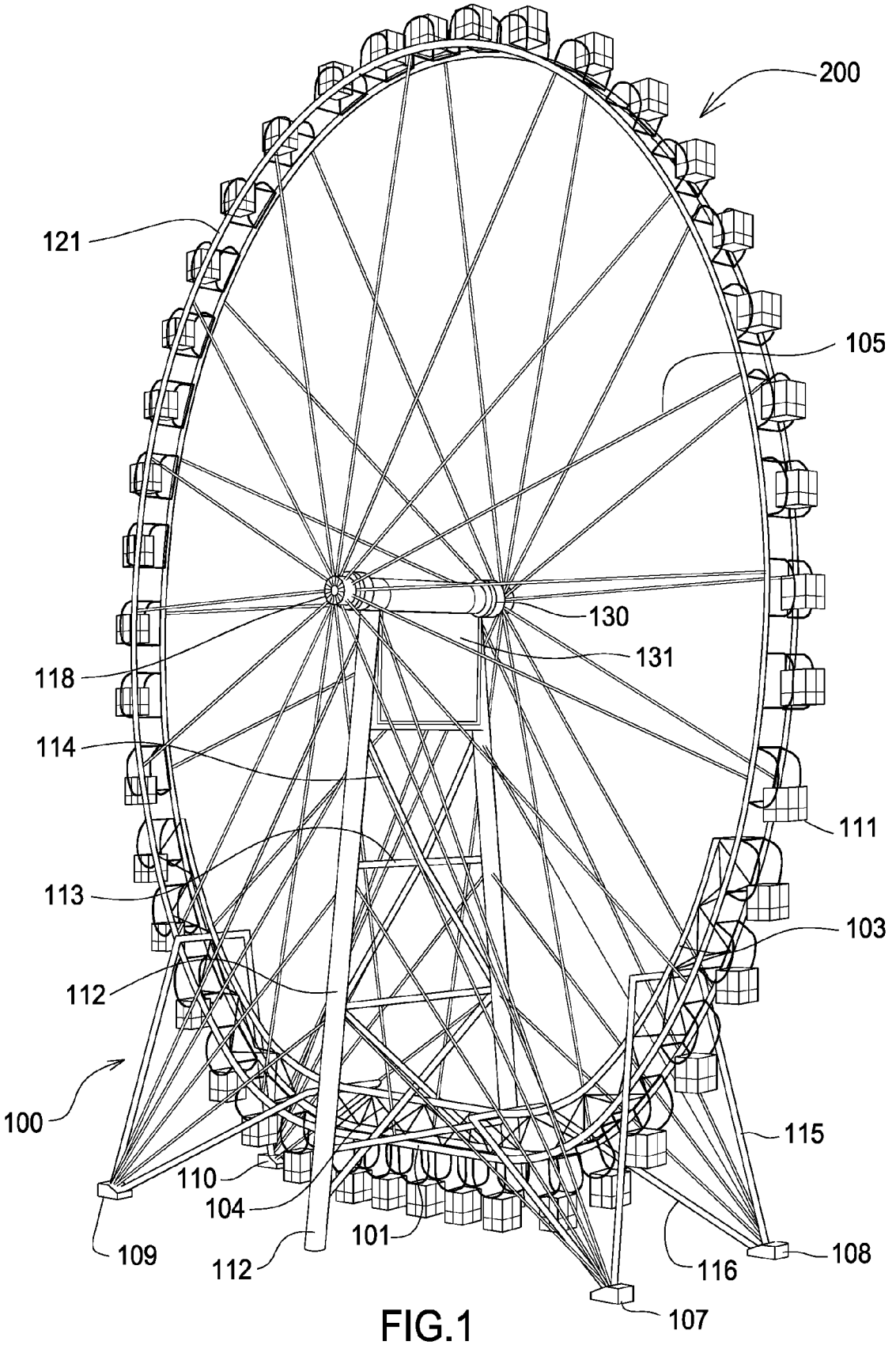

200
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FIG.1

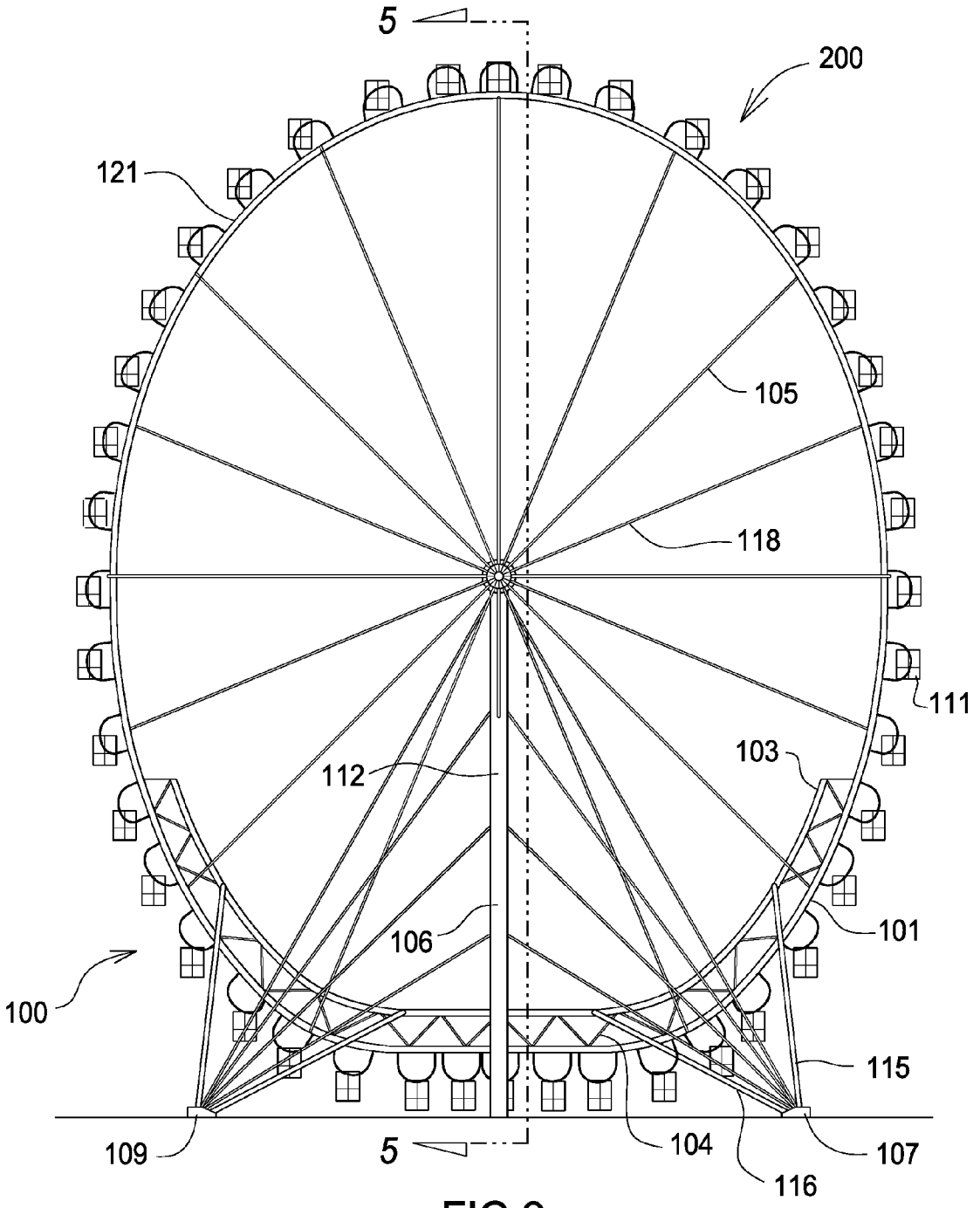

FIG.2

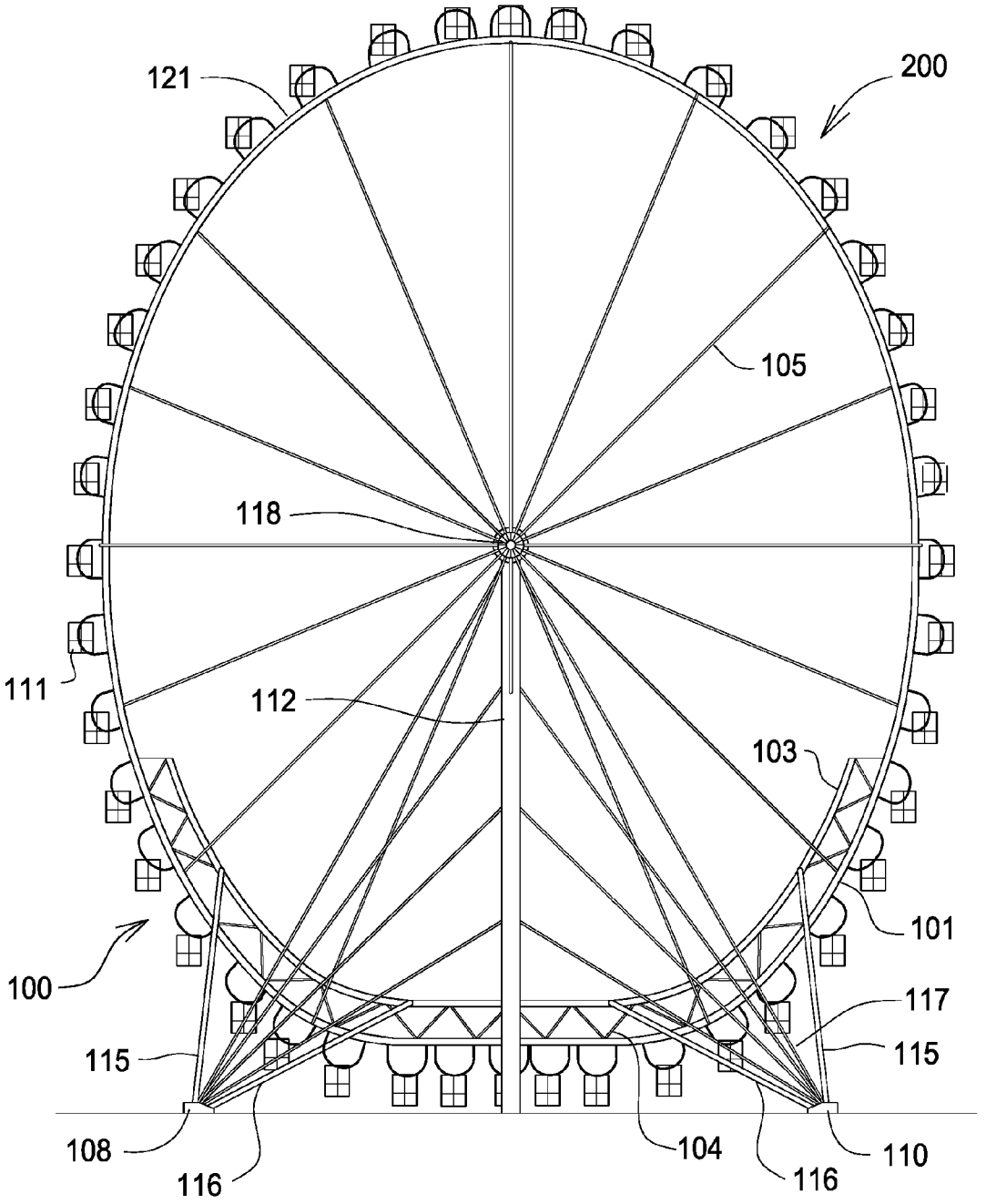
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FIG.3

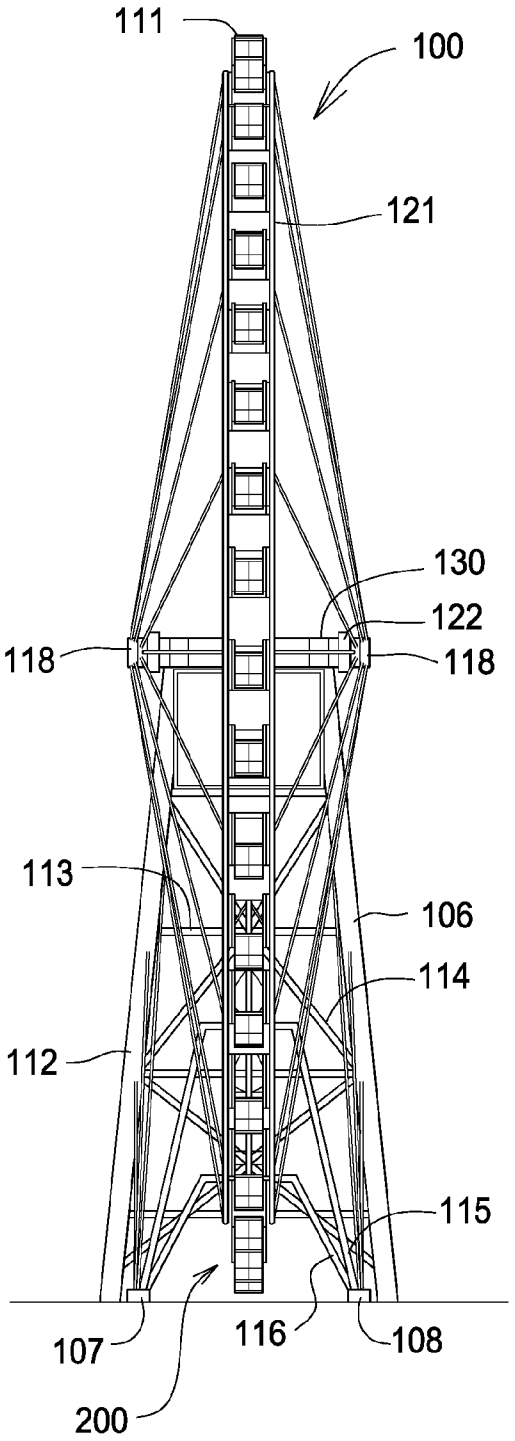
111
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FIG.4

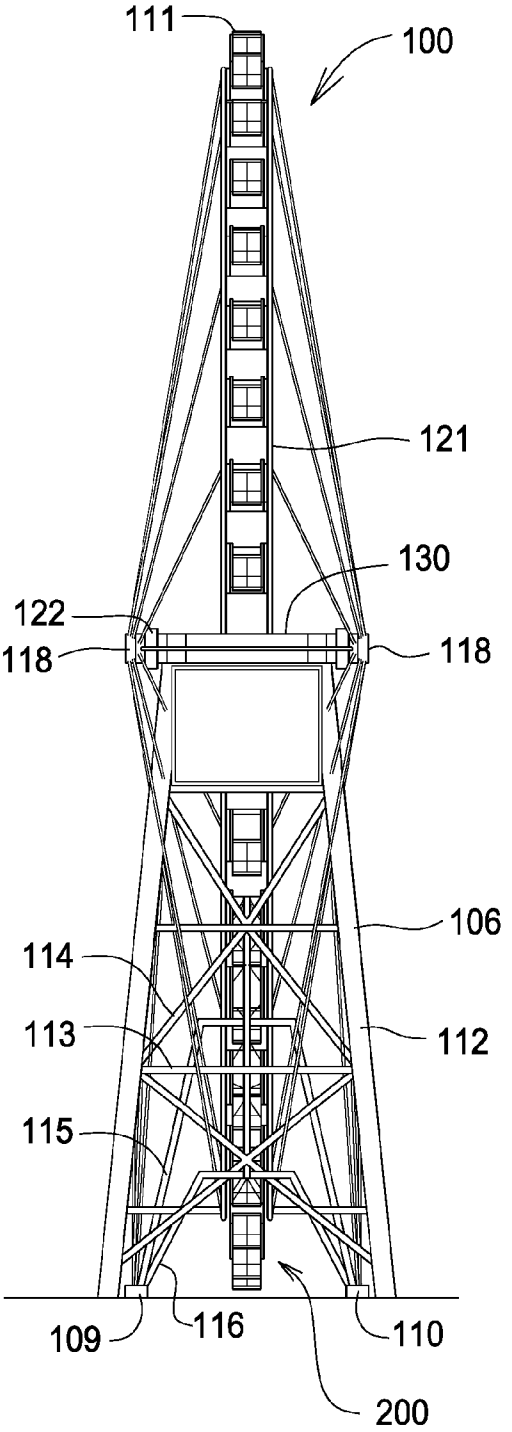
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FIG.5

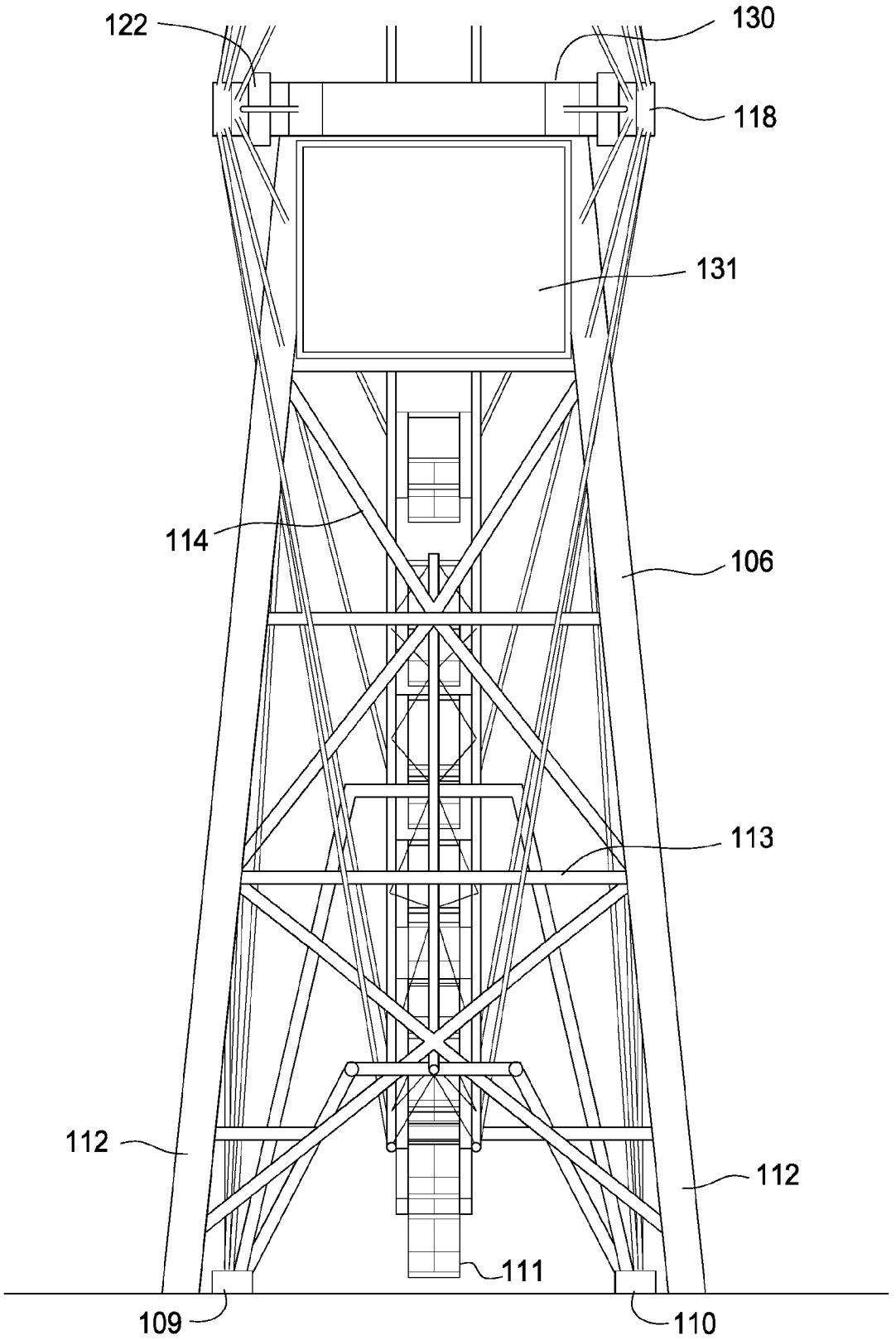


FIG.6

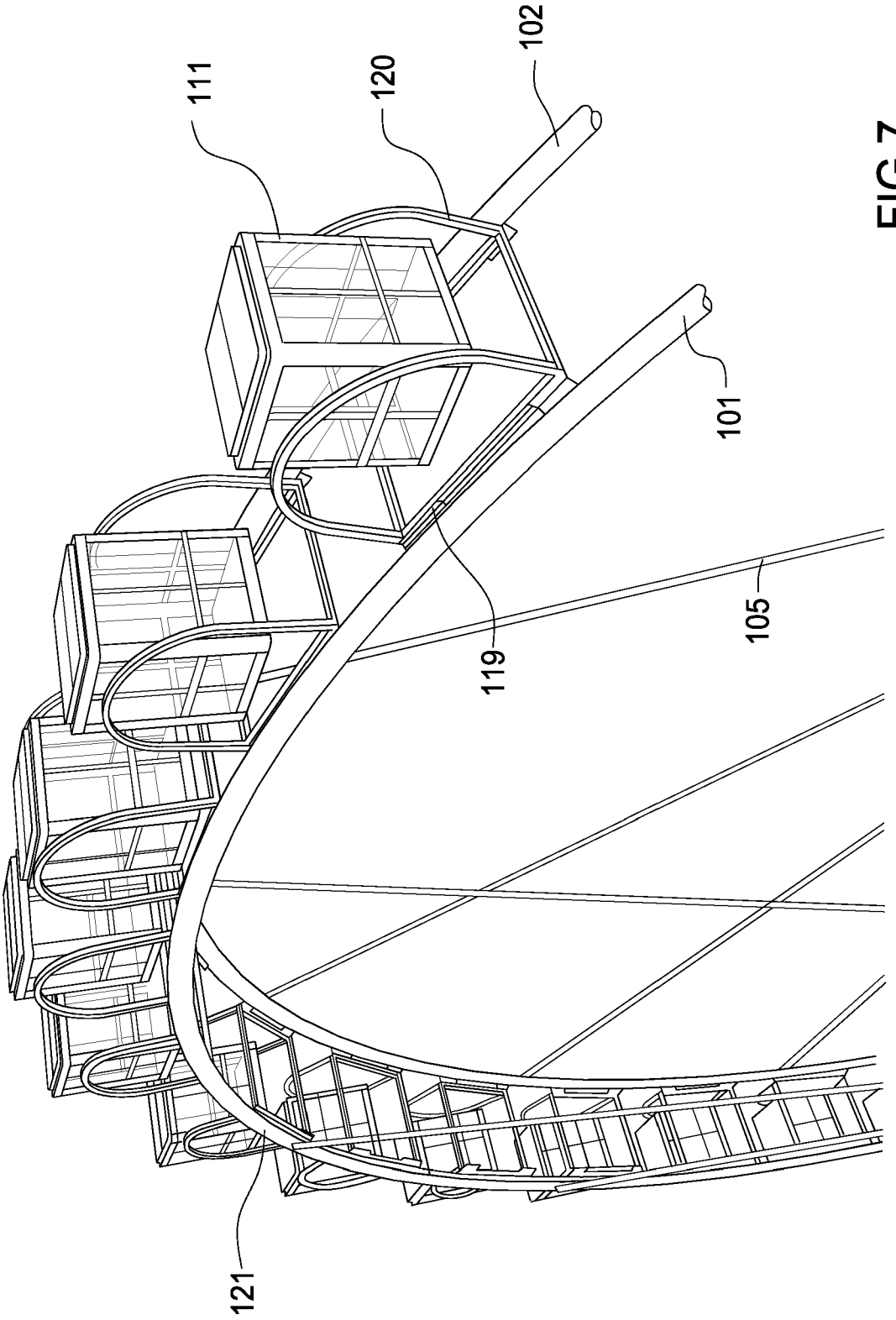


FIG.7

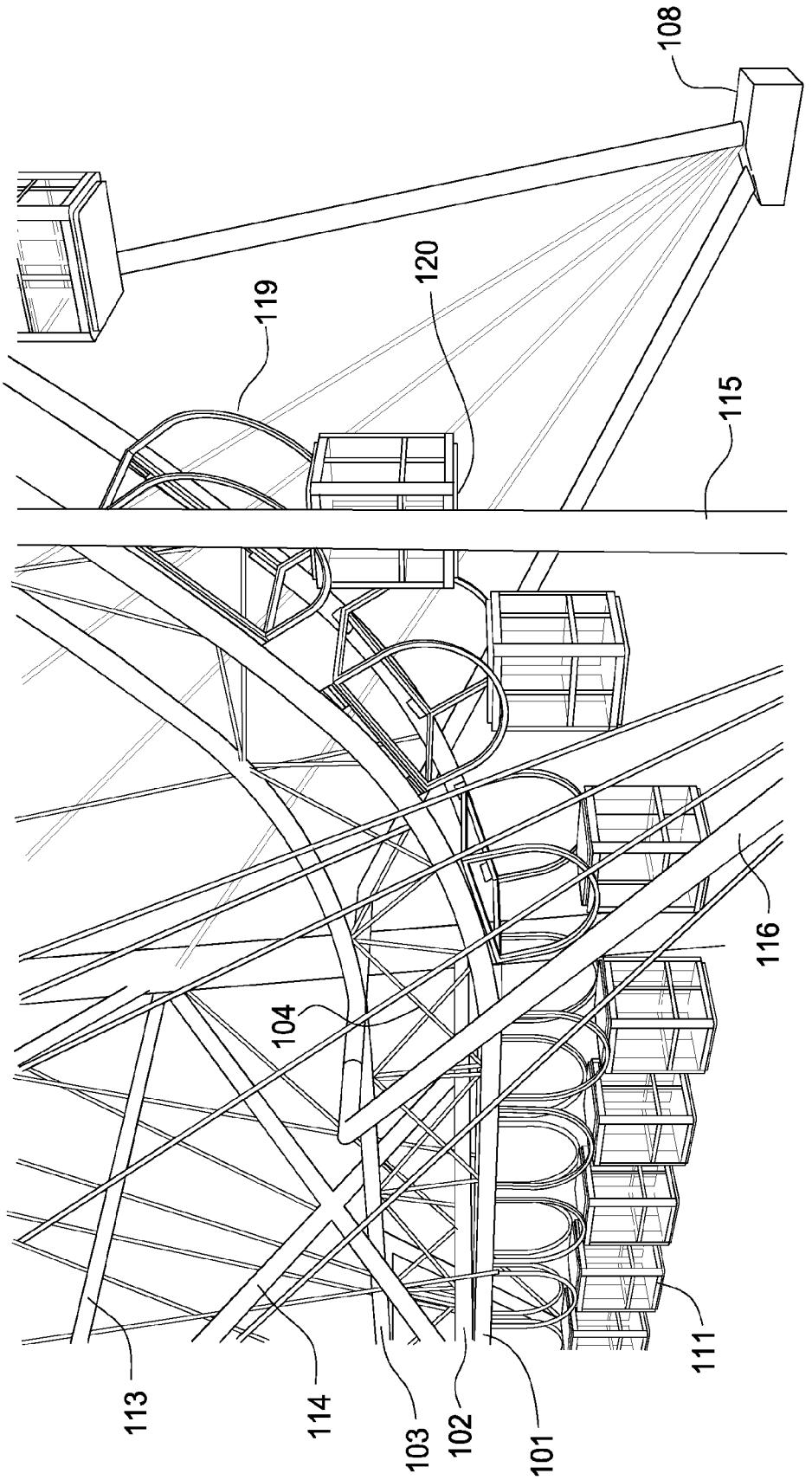


FIG.8

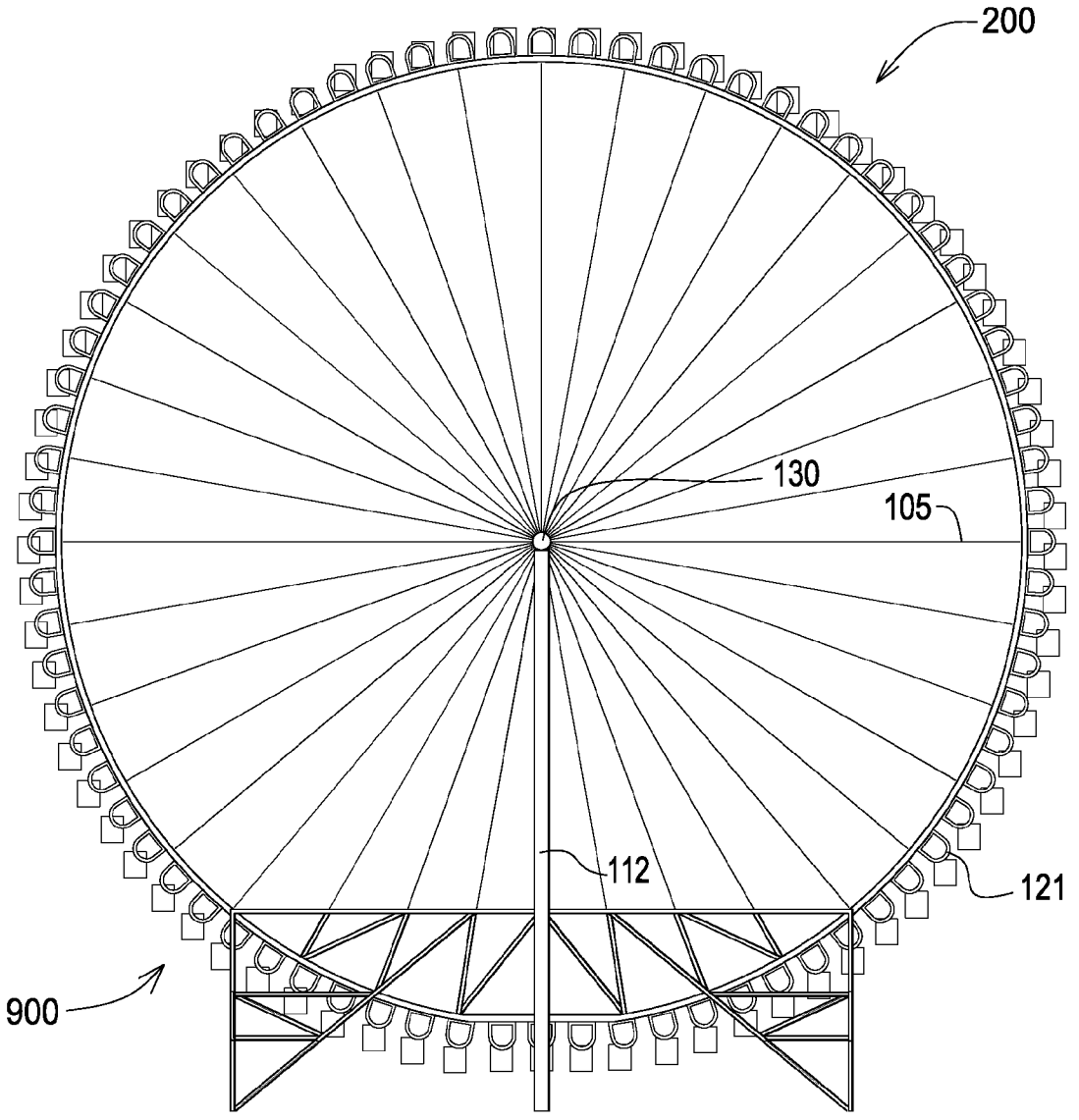
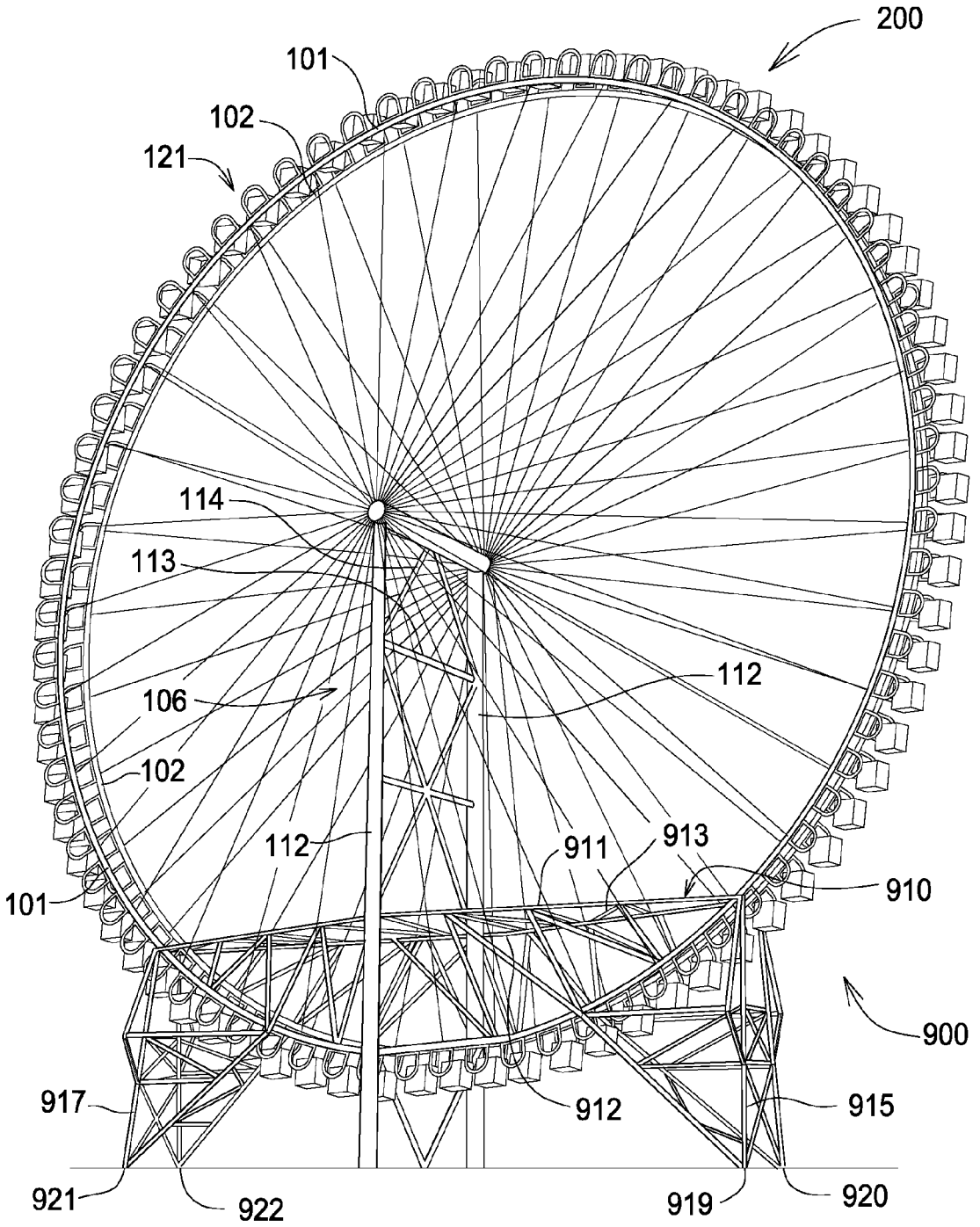


FIG.9


200
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920

FIG.10

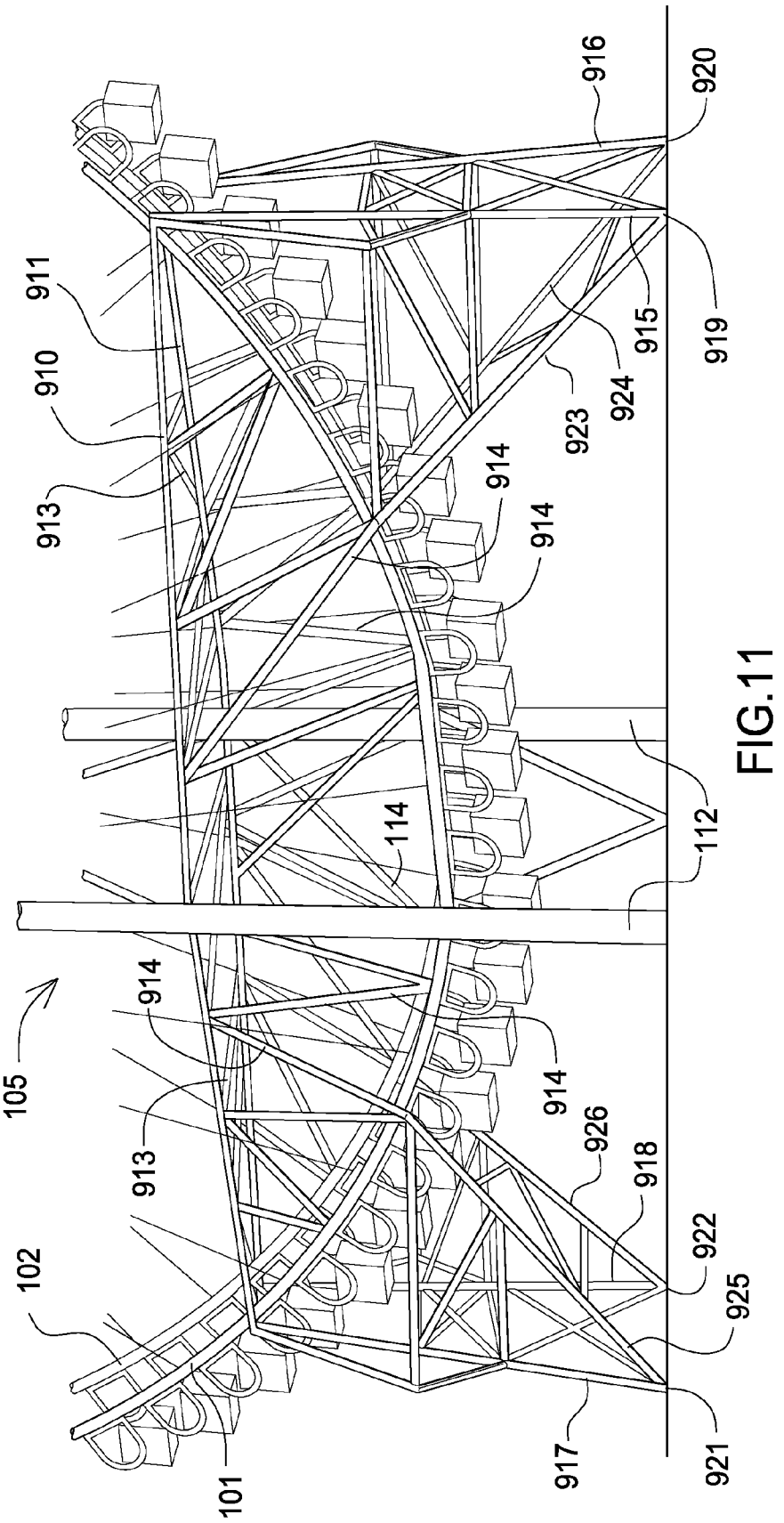
916
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FIG.11

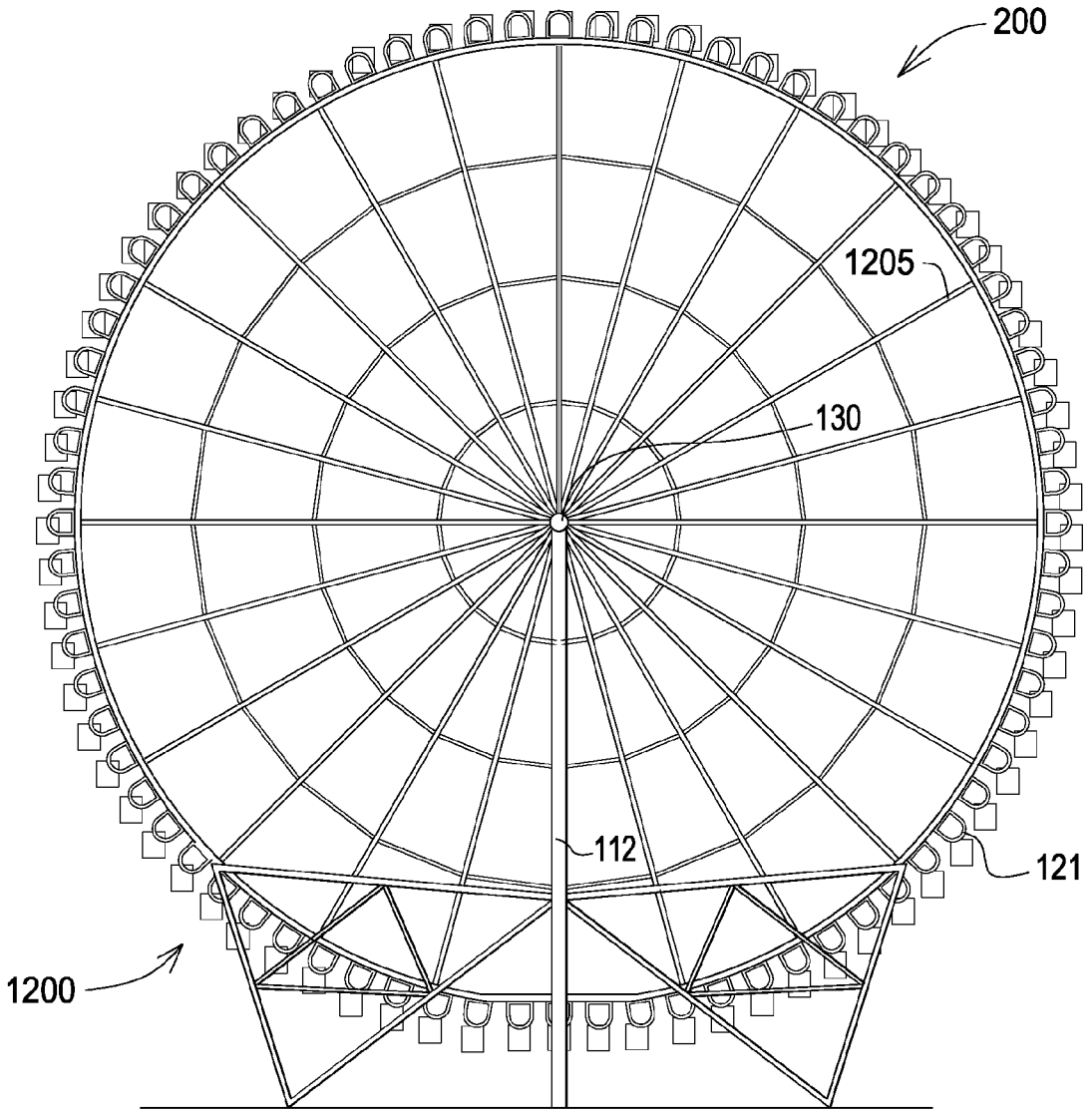


FIG.12

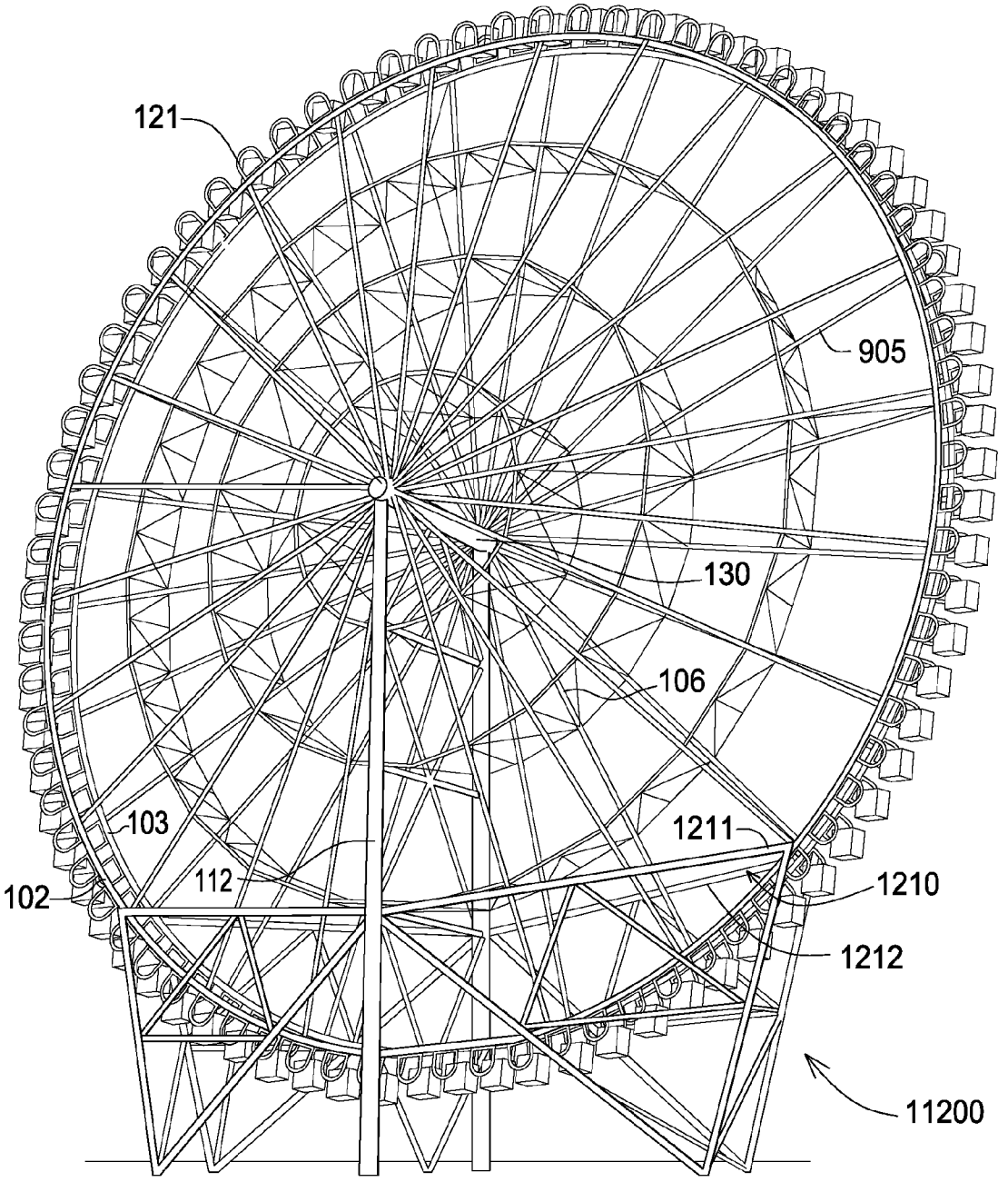
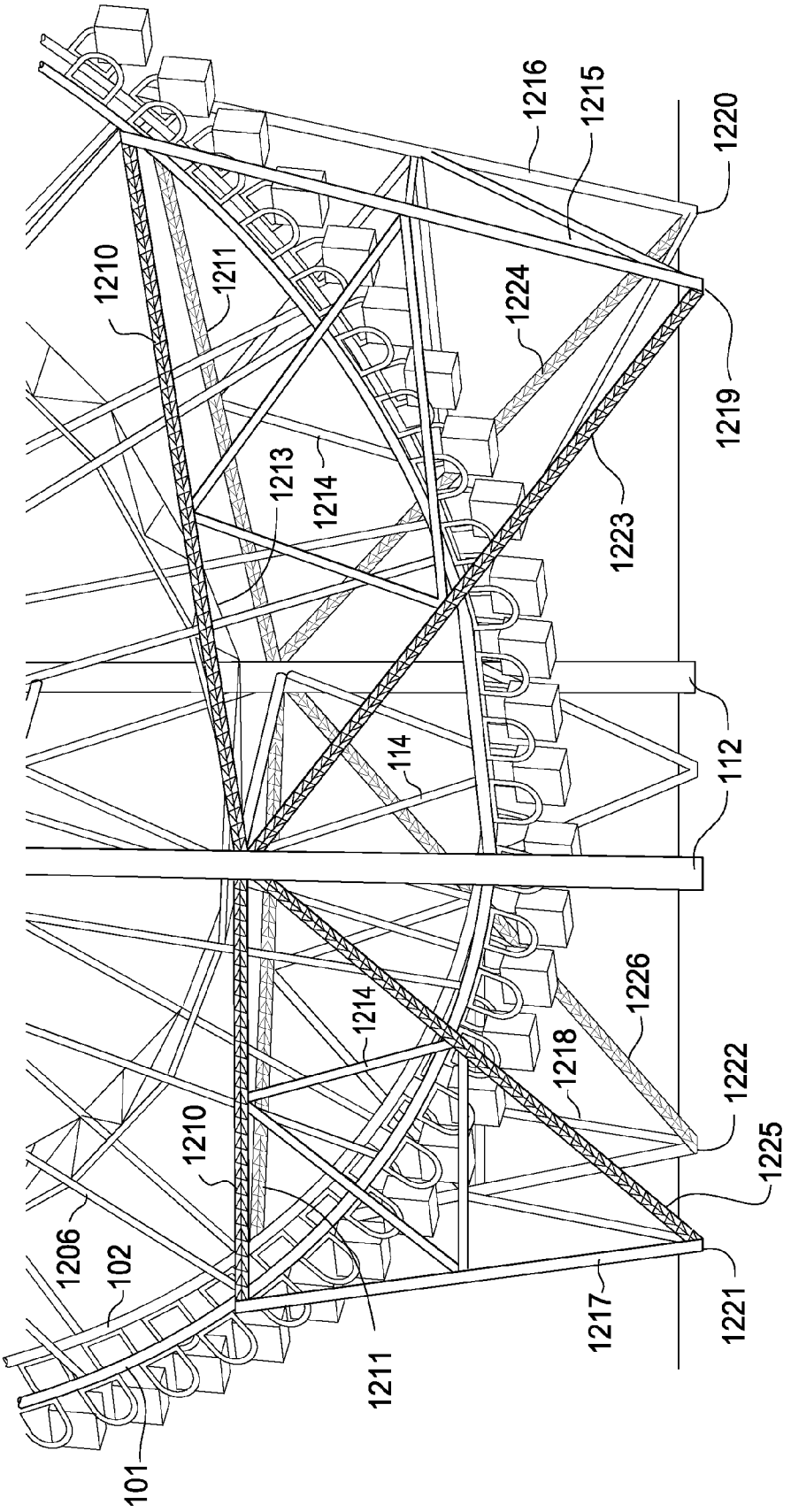


FIG.13


1216
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1210
1225
1206
102
1211
1217
1221
101

FIG.14

NARROW BASE VIEWING WHEEL

CROSS REFERENCE APPLICATIONS

[0001] This application is a non-provisional application claiming the benefits of provisional application No. 61/385,921 filed Sep. 23, 2010, which is incorporated by reference for all purposes. This application also incorporates by reference international application no. PCT/US10/47986 in its entirety.

BACKGROUND

[0002] Traditional Ferris wheels require a large ground area due to the size and required configuration of the support structure once they are built taller than 15 to 30 meters (50 or 100 feet). This required structure has prevented erection of tall Ferris wheels for use as viewing wheels in areas having limited space.

[0003] The foregoing example of the related art and limitations related therewith are intended to be illustrative and not exclusive. Other limitations of the related art will become apparent to those of skill in the art upon a reading of the specification and a study of the drawings.

SUMMARY

[0004] The following embodiments and aspects thereof are described and illustrated in conjunction with systems, tool and methods which are meant to be exemplary and illustrative, not limiting in scope. In various embodiments, one or more of the above described problems have been reduced or eliminated, while other embodiments are directed to other improvements.

[0005] A structural system is disclosed which can fully support a viewing of a height of greater than about 60 meters (200 feet) wheel utilizing a much narrower frame.

[0006] The wheel incorporates a track on which rider carriages run. The wheel itself does not turn.

[0007] As the wheel does not turn as most prior art wheel others do, a moment frame with diagonal bracing can intertwine with the cable spokes to form a support system from the ground that will resist lateral overturning forces in a very efficient manner. This will allow this wheel to be installed in a narrow site with a width dimension of only 25 to 26 meters (85 feet), while still reaching a height of 152 meters (500 feet). Installation can be achieved without altering the surrounding environment, such as by removing existing structures. No other observation wheel with a similar height to width ratio can be installed economically.

[0008] In addition to the exemplary aspects and embodiments described above, further aspects and embodiments will become apparent by reference to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. **1** is a perspective view of one embodiment of the narrow base viewing wheel.

[0010] FIG. **2** is front elevation view of the narrow base viewing wheel.

[0011] FIG. **3** is a rear elevation view of the narrow base viewing wheel.

[0012] FIG. **4** is a left side elevation view of the narrow base viewing wheel.

[0013] FIG. **5** is a cross sectional view of the narrow base viewing wheel along line **5-5**.

[0014] FIG. **6** is an elevation view of the support structure for the narrow base viewing wheel.

[0015] FIG. **7** is a perspective view of a top side of the viewing wheel with the rider carriages.

[0016] FIG. **8** is a perspective view of the bottom side of the viewing wheel with the rider carriages.

[0017] FIG. **9** is a front elevation view of an alternate embodiment of a narrow base viewing wheel.

[0018] FIG. **10** is a front perspective view of the narrow base viewing wheel of FIG. **9**.

[0019] FIG. **11** is a front elevation view of a second alternate embodiment of a narrow base viewing wheel.

[0020] FIG. **12** is a front perspective view of the narrow base viewing wheel of FIG. **11**.

[0021] Before explaining the disclosed embodiment of the present invention in detail, it is to be understood that the invention is not limited in its application to the details of the particular arrangement shown, since the invention is capable of other embodiments. Exemplary embodiments are illustrated in referenced figures of the drawings. It is intended that the embodiments and figures disclosed herein are to be considered illustrative rather than limiting. Also, the terminology used herein is for the purpose of description and not of limitation.

DETAILED DESCRIPTION OF THE DRAWINGS

[0022] Referring first to FIGS. **1-8**, an amusement ride **100** is shown. Amusement ride **100** includes two carriage rails **101**, **102**, which together form a track **121**. The track can be between 57 to 244 meters (200 to 800 feet) in total height. In the lower portion of the track a third rail **103** is added for additional support and rigidity. Third rail **103** is approximately equidistant between carriage rails **101**, **102** in the depicted embodiment. Third rail **103** extends upward along the track **121** approximately 10% to 30% of the overall height of the amusement ride **100**, functioning as a support rail. In the depicted embodiment, third rail **103** substantially parallels approximately 30% of the inner circumference of amusement ride **100**. In the depicted embodiment, third rail **103** is between approximately 100 feet and approximately 300 feet in length. In the depicted embodiment, carriage rails **101**, **102** and third rail **103** are made of steel. While steel is depicted, any material having similar strength and rigidity could be used. As can be seen in FIG. **1**, signage **131** can be placed between the columns **112**.

[0023] Braces **104** attach carriage rails **101**, **102** and third rail **103** together. In the depicted embodiment braces **104** are made of steel. In the depicted embodiment, braces **104** are welded to carriage rails **101**, **102** and third rail **103**. The gauge of steel may be varied depending on the height of amusement ride **100**. Braces **104** can vary in length from approximately 3 meters (10 feet) to approximately 10 meters (30 feet), depending on the height of amusement ride **100**. The number of braces **104** is also variable, depending on the height of the wheel. In the depicted embodiment, braces **104** are arranged in a triangular configuration. While other configurations could be used, a triangular configuration is the most efficient configuration for providing strength. The third rail **103** and braces **104** function as a support rail to stiffen the track **121** and support the weight of the whole wheel **200**.

[0024] Connection cables **105** attach to beam **130** of center frame **106** at hubs **118** attach the track **121**. The connection

cables **105** are under tension to hold and support the structure. Collar **122** serves as an attachment point for connection cables **105**. In the depicted embodiment, connection cables **105** are made of 1" to 3" gauge steel. The number of connection **105** cables can vary between 36 and 72, depending on the size of amusement ride **100**. Connection cables **105** attach to hub **118** and carriage rails **101**, **102** via compressed fittings attached to connection cables **105**, which are bolted to hub **118** and carriage rails **101**, **102**. Hub **118** is made of steel. Hub can be between approximately 3 meters (10 feet) and 10 meters (30 feet) diameter, depending on the size of wheel **200**.

[0025] The combination of third rail **103**, ground anchors **107**, **108**, **109**, **110**, bars **115**, **116** and stay cables **117** hold the carriage track **121** in a substantially vertical position and allow enough room between the carriage track **121** and the ground for rider carriages **111** to move freely. With the center frame **106** they form the sole support of the ride, eliminating the standard guy wires or other bracing extending from the sides of the ride. Ground anchors **107**, **108**, **109**, **110** attach to support rail **103** through bars **115**, **116**. The shape of ground anchors **107**, **108**, **109**, **110** allows for compression and overturning moments from amusement ride **100**. Stay cables **117** attach to ground anchors **107**, **108**, **109**, **110** at one end and center frame **106** at the other. Each stay cable **117** is attached to center frame **106** at a point that provides maximum structural strength. Using a prior art design of stay cables a stationary track view ride that is approximately 152 meters (500 feet) tall would require a ground footprint of approximately 61 meters by 91 meters (200 feet by 300 feet). Using the disclosed narrow base design approximately 152 meters (500 feet) tall ride can be placed in a ground footprint of about 25 to 61 meters (80 feet by 200 feet), allowing much greater flexibility in the placement of such viewing wheels.

[0026] Ground anchors **107**, **108**, **109**, **110** can be between approximately 15 to 46 meters (50 feet and 150 feet) from center frame **106**, depending on local conditions and size of wheel. The distance between ground anchors **107**, **108**, **109**, **110** and center frame **106** is proportionate to the size of wheel **200**. Ground anchors **107**, **108**, **109**, **110** are made of steel and concrete. Bars **115**, **116** can range from a length of approximately 20 feet to 60 feet, depending on the size of wheel **200**. Bar **115** can be at an angle of approximately 5 to 15 degrees to the ground. Bar **116** can be at an angle of approximately 30 to 45 degrees to the ground. These angles are designed for maximum stability. Bars **115**, **116** are made of 6 to 18" steel. In the depicted embodiment, stay cables **117** are made of 1 to 3" diameter steel wire rope cables in the depicted embodiment. While the depicted embodiment features four stay cables **117** from each ground anchor **107**, **108**, **109**, **110** to center frame **106**, the number of stay cables is variable.

[0027] FIG. **6** provides the most detailed views of center frame **106**. Center frame **106** is comprised of columns **112** attached to top beam **130** and beams **113** and diagonal braces **114** between the columns **112**. Center frame **106** is a moment frame, wherein frame **106** both supports the vertical load of the carriage rails **101**, **102**, and rider carriages **111** and resists lateral forces, such as wind. The lateral resistance in center frame **106** is provided by diagonal braces **114** and rigid joinder of beams **113** to columns **112**. Center frame **106** is attached to hubs **118** on top beam **13**. Connection cables **105** attach to hubs **118** on both sides of the top beam **130** to achieve additional stability. The ground anchors **107**, **108**, **109**, **110** attached to the support rail **103** provide the stability for the support track in the other two directions (side to side) in addition to the center frame **106** support in the lateral directions. As seen in FIG. **6**, the ground anchors are inside the width of the columns **112** at the base of the columns. In most embodiments the base of the columns **112** is the widest part of the ride, a significant change from the prior art. This combination of supports function to hold the support track stable in all directions of movement on a very narrow base. As can be seen in FIG. **1**, signage **131** can be placed between the columns **112**.

[0028] In the depicted embodiment, columns **112** are between 1 to 4 meters (3 to 12 feet) in diameter. The columns **112** can be filled with concrete for additional stability. Beams **113** are 1 to 3 feet in diameter and diagonal braces **114** are all sized appropriate for the load being supported. While four beams **113** and four braces **114** or shown, either more or less of each could be used. The depicted configuration achieves maximum stability with minimum cost. Diagonal braces **114**, beams **113** and columns **112** can be attached to one another via welding or bolts.

[0029] FIGS. **7** and **8** are close-up views of the rider carriages **111** on the support carriages **119** at different locations on the ride **100**. These views demonstrate the rotation of the rider carriages **111** on the support carriages **119**. During rotation, the floor **120** of the rider carriages **111** remains, on average, substantially level as the rider carriages traverse around the track **121**. A large number of possible ways to attach the rider carriages **111** to the track **121** and to have them rotate as the rider carriage **111** move around the track exist. Any of the known or later developed means that will work with the fix track design could be used with this track **121**. No limitation is intended or should be implied. The floor **120** should always remain within a range of level that reduces the chance that that the riders would fall against the sides. If desired, the floor and/or roof of the rider carriage **110** could be made at least partially of transparent material as well as the sides, as shown in the depicted embodiment.

[0030] Turning next to FIGS. **9**, **10** and **11** an alternate embodiment of the narrow base viewing wheel **900** is depicted. In this embodiment uses a wire rope spoke configuration where the connection cables **105** are wire rope. The center frame **106** is the same as in the previous embodiment. In this embodiment the third rail is replaced by a support frame **910** with two beams **911** and **912**, one on each side to form the support rail of the previous embodiment. The two beams **911** and **912** have the same function as the third rail **103** of stiffening the track and transferring the some load of the track move evenly. Beam **911** extends between carriage rail **101** to the column **112** and then on to the carriage rail **101** on the opposite side of the track **200**. Beam **912** extends between carriage rail **102** to column **112** and then on to carriage rail **102** on the other side. Beams **911**, **912** are approximately parallel to the ground in the depicted embodiment. Braces **913** extend between beam **911** and **912** as seen in FIG. **10**. Support beams **914** extend between beams **910** and **911** and carriage rails **101**, **102** respective in a bracing pattern. Supports **915**, **916**, **917** and **918** attach to ground anchors **919**, **902**, **921** and **922** respectively. Supports **915**, **916** and **918** attach to the track **121** at the point that beams **910** and **911** attach, allowing the beams **910** **911** to spread the load to the ground anchors. Angle beams **923**, **924**, **925**, and **926** extend at an angle from the ground anchors towards the columns **112** and attach at approximately the midpoint between the columns **112** and the point beams **910**, **911** attach to the rails **101**, **102** in the depicted embodiment. Additional cross

bracing between the various beam and rails is provide as needed depending on the size of the wheel and the passenger load expected.

[0031] Referring next to FIGS. **12**, **13** and **15** the depicted embodiment of the narrow base viewing wheel **1200** uses rigid pipe spokes **1205** and bracing instead of the wire rope spokes **105** of the embodiment of FIGS. **9** through **11**. This embodiment can be built with less assistance from cranes, making suitable for erection in areas that are hard to operate cranes in. The center frame **106** is the same as in the previous embodiments. In this embodiment the third rail is replaced by a support frame **1210** with two beams **1211** and **1212**, one on each side forming the support rail. Beam **1211** extends between carriage rail **101** to the column **112** and then on to the carriage rail **101** on the opposite side of the track **200**. Beam **1212** extends between carriage rail **102** to column **112** and then on to carriage rail **102** on the other side. Braces **1213** extend between beam **1211** and **1212** as seen in FIG. **13**. Beans **1211**, **1212** are approximately parallel to the ground Support beams **1214** extend between beams **1210** and **1211** and carriage rails **101**, **102** respective in a bracing pattern. Supports **1215**, **1216**, **1217** and **1218** attach to ground anchors **1219**, **1202**, **1221** and **1222** respectively. Supports **1215**, **1216** and **1218** attach to the track **121** at the point that beams **1210** and **1211** attach, allowing the beams **1210** **1211** to spread the load to the ground anchors. Angle beams **1223**, **1224**, **1225**, and **1226** extend at an angle from the ground anchors towards the columns **112** and attach at approximately the midpoint between the columns **112** and the point beams **1210**, **1211** attach to the rails **101**, **102** in the depicted embodiment. Additional cross bracing between the various beam and rails is provide as needed depending on the size of the wheel and the passenger load expected.

[0032] In the depicted embodiments, all materials not previously specified comprise steel. While steel is depicted, any material having similar strength and durability could be used.

[0033] While a number of exemplary aspects and embodiments have been discussed above, those of skill in the art will recognize certain modifications, permutations, additions and sub-combinations therefore. It is therefore intended that the following appended claims hereinafter introduced are interpreted to include all such modifications, permutations, additions and sub-combinations are within their true spirit and scope. Each apparatus embodiment described herein has numerous equivalents.

[0034] The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed. Thus, it should be understood that although the present invention has been specifically disclosed by preferred embodiments and optional features, modification and variation of the concepts herein disclosed may be resorted to by those skilled in the art, and that such modifications and variations are considered to be within the scope of this invention as defined by the appended claims. Whenever a range is given in the specification, all intermediate ranges and subranges, as well as all individual values included in the ranges given are intended to be included in the disclosure. When a Markush group or other grouping is used herein, all individual members of the group and all combinations and subcombinations possible of the group are intended to be individually included in the disclosure.

[0035] In general the terms and phrases used herein have their art-recognized meaning, which can be found by reference to standard texts, journal references and contexts known to those skilled in the art. The above definitions are provided to clarify their specific use in the context of the invention.

1. A narrow based fixed track viewing wheel comprising:
- a stationary rider track forming a closed loop;
- the stationary rider track being made of at least two parallel carriage rails;
- rider carriages moveably mounted on the carriage rails such that the rider carriages can move along the track for one or more circuits of the track;
- the total height of the ride being at least 57 meters;
- a moment frame as a center frame, the center frame having at least two columns and a top beam extending there between;
- the two columns and the top beam being further connected by cross bracing;
- the stationary rider track being attached to the top beam by spokes;
- a support rail extending along a portion of the lower half of the closed loop, said support rail attached to the carriage rails; and
- at least four footings attached to the support rail by bars extending there between, wherein the moment frame and support rail function to provide all of the support for the ride and keep the ride vertical.

2. The device of claim **1** wherein the base of the two columns is the widest point of the ride.

3. The device according to claim **1** wherein the support rail is substantially parallel to the carriage rails.

4. The device of claim **3** further comprising bracing extending between the support rail and the carriage rails.

5. The device of claim **4** wherein the bracing extending between the support rail and the carriage rails is in a triangular configuration.

6. The device according to claim **1** wherein the support rail is substantially parallel to the ground.

7. The device of claim **6** wherein the support rail is formed of two beams extending between two points on the track located on opposing sides of the track.

8. The device of claim **7** further comprising bracing extending between the two beams.

9. The device of claim **2** wherein the footings are attached to the support rail by cross bracing.

10. The device of claim **1** further comprising signage between the columns.

* * * * *