Title: A VERTICAL ROTARY PARKING SYSTEM

Abstract: The parking system having a hanger support plate (31) manufactured with increased precision includes a suspension chain (30) including a hanger support plate (31) fixed to the suspension chain (30) at a predetermined interval and circulating so as to form an endless track, chain guide rails (111, 112) and supported by a flame (100) and guiding the suspension chain (30), a hanger supported by the hanger support plate and including a pallet (121) on which a vehicle is loaded, an annular rotating body rotatably supported by the flame and including a pull block (51), protruding outward from the annular rotating body, a driving motor (200) rotating the annular rotating body, and a combination unit coupled with the hanger support plate so that the pull block goes in and out, wherein the combination unit includes a concave first combination groove (31a) formed on the end of the hanger support plate and having the same shape as a combination portion of the pull block (51).
A VERTICAL ROTARY PARKING SYSTEM

TECHNICAL FIELD

The present invention relates to a vertical rotary parking system that vertically circulates pallets on which vehicles are loaded and are fixed to a suspension chain at a predetermined interval, and more particularly, to a vertical rotary parking system having improved tooth surface resistance and surface pressure resistance due to a circumscribed gear and having accurate engagement between a hanger support plate and a pull block due to a dog integrated into the hanger support plate.

BACKGROUND ART

Korean Patent No. 0485605 of the assignee of the present invention discloses a vertical rotary parking system, which is shown in FIGS. 1 through 3. Referring to FIGS. 1 through 3, a pair of chain guide rails 111 and 112 is fixed to a flame 100 so as to form a vertically long endless track. A suspension chain 130 constituted with a chain link plate 131 and link pins 132 is coupled between the chain guide rails 111 and 112 so as to be circulated.

Hanger support plates 140 are fixed to a suspension chain 130 at predetermined intervals, and hangers 120 having pallets 121, on which vehicles are loaded, are supported by the hanger support plates 140. Both side portions of each of the hangers 120 are designed so as to be guided to a hanger guide rail 125.

In a driving unit for circulating the suspension chain 130, a driving motor 200 for generating power is installed on the flame 100, and an annular rotating body 150 is rotatably installed on the flame 100. The annular rotating body 150 includes an inscribed gear 151 formed on its inner circumference, and pull blocks 152 and 153 are formed opposite to each other. The pull blocks 152 and 153 protrude outward from the annular rotating body 150.

The inscribed gear 151 interlocks with a pinion 232 driven by power of the driving motor 200 so as to be rotated.

A pair of dogs 141 and 142, which is separated from each other by a distance corresponding to the width of each of the pull blocks 152 and 153, constitutes the
hanger support plate 140.

When the end of the pull block 152 or 153 enters between the dogs 141 and 142 of the hanger support plate 140, the annular rotating body 150 is rotated, and accordingly, the suspension chain 130 is circulated.

In the above-described vertical rotary parking system, since a suspension chain is circulated while a hanger support plate is being pulled by a pull block, the occurrence of surge is minimized so that noise generated due to driving of the driving unit is greatly reduced. However, since the dogs 141 and 142 are fixed to the hanger support plate 140 by welding of a people, operations of manufacturing the parking system are complicated, welded portions may be separated, and a degree of engagement between the pull block and the dog may be different according to proficiency for forming the dog.

DISCLOSURE OF INVENTION

The present invention provides the following objects to solve the above problem.

First, the present invention provides an improved vertical rotary parking system having accurate engagement between a pull block and a dog.

Second, the present invention provides the improved vertical rotary parking system including the dog manufactured using a simple operation of interlocking with the pull block, wherein the dog constitutes a hanger support plate supporting a hanger on which vehicles are loaded.

Third, the present invention provides the vertical rotary parking system having improved tooth surface resistance and surface pressure resistance between an annular rotating body and a drive gear, wherein the annular rotating body rotates a suspension chain pulling the hanger to be circulated.

According to an aspect of the present invention, there is provided a vertical rotary parking system including a suspension chain including a hanger support plate fixed to the suspension chain at a predetermined interval and circulating so as to form an endless track, a chain guide rail supported by a flame and guiding the suspension chain, a hanger supported by the hanger support plate and including a pallet on which a vehicle is loaded, an annular rotating body rotatably supported by the flame and including a pull block protruding outward from the annular rotating body, a driving motor
rotating the annular rotating body, and a combination unit coupled with the hanger support plate so that the pull block goes in and out, wherein the combination unit includes a concave first combination groove formed on the end of the hanger support plate and having the same shape as a combination portion of the pull block.

The suspension chain may include the hanger support plate and a chain link plate, which are alternately connected by a link pin so as to be rotated, and a second combination groove may be coupled with the chain link plate so that the pull block goes in and out.

A circumscribed gear may be formed on an outer circumference of the annular rotating body, and a pinion, which is rotated by power of the driving motor, is interlocked with the circumscribed gear so as to rotate the annular rotating body.

According the parking system of the present invention, since the hanger support plate is pulled by the pull block, and accordingly, the suspension is circulated, noise generated due to driving is greatly reduced and the structure of the parking system is simple. In addition, since the first combination groove, with which the pull block is coupled, is integrated into the hanger support plate, the parking system can be easily manufactured compared with a convention parking system manufactured using a method in which a dog is formed by welding, and the parking system can realize accurate engagement with the pull block to be well driven.

The present invention will now be described more fully with reference to the accompanying drawings, in which preferred embodiments of the invention are shown.

In the parking system of the present invention, the hanger support plate is fixed to the suspension chain circulating so as to form an endless track at a predetermined interval, and the hanger, on which a vehicle is loaded, is supported by the hanger support plate and is vertically circulated. In particular, the parking system according to an embodiment of the present invention uses a method in which the hanger support plate is circulated while being pulled by the rotating pull block rather than a method in which power is transmitted while the suspension and a sprocket are being directly interlocked with each other. Accordingly, noise generated due to driving of the driving unit is greatly reduced, and the structure of the driving unit is simple.
In addition, the structure of the hanger support plate pulled by the pull block is simple, and thus the parking system is easily manufactured and has accurate engagement between the hanger support plate and the pull block.

The vertical rotary parking system according to embodiments of the present invention will be described. Referring to FIGS. 4 and 5, a pair of chain guide rails 111 and 112 is fixed to a flame 100 so as to form a vertically long endless track. A suspension chain 30 is coupled between the chain guide rails 111 and 112 so as to be circulated.

The suspension chain 30 is circulated by an annular rotating body 50 including a circumscribed gear 50a, which is formed on its outer circumference, rotated by power of a driving motor 200. The annular rotating body 50 is supported by an annular fixing body 60 fixed to the flame 100 so as to be rotated by a bearing (not shown).

Referring to FIGS. 6 and 7, a drive axis 230 and a pinion 201 are fixed to the end of the flame 100. The pinion 201 is interlocked with the circumscribed gear 50a, and the drive axis 230 includes a drive sprocket 231. The drive axis 230 is rotated by engagement between a motor sprocket 210 of the driving motor 200 and a chain 220 of the drive sprocket 231.

Four pull blocks 51 are fixed to the annular rotating body 50 at intervals of 90 degrees so as to pull the suspension chain 30.

Referring to FIGS. 5, 8 and 9, the suspension chain 30 includes a hanger support plate 31, a connecting link 33 and a chain link plate 32 which are alternately connected by link pins 35 so as to be rotated. A roller 34 is coupled with each of the link pins 35. Here, the roller 34 is coupled with the chain guide rails 111 and 112 to be guided. A hanger 120 including a pallet 121, on which vehicles are loaded, is supported by one end of the hanger support plate 31 (See FIG. 4). A first combination groove 31a, with which the pull block 51 of the annular rotating body 50 are coupled, is formed on the other end of the hanger support plate 31. The first combination groove 31a is formed using a mold, or using a cutting machine according to numerical control.

A second combination groove 32a is coupled with the chain link 32 so that the pull block 51 may go in and out.

The vertical rotary parking system having such a structure operates as follows.
First, as illustrated in FIG. 4, a vehicle is loaded on the hanger 120 that is located adjacent to the ground, the driving motor 200 is driven. As illustrated in FIG. 7, the power of the driving motor 200 passes through the motor sprocket 210 and the drive sprocket 231, and rotates the drive axis 230. At this time, the annular rotating body 50 is rotated with respect to the annular fixing body 60 by a rotation of the pinion 201.

As illustrated in FIG. 5, when the hanger support plate 31 or chain link plate 32 of the suspension chain 30 enters on a path along which the pull block 51 rotates, the end of the pull block 51 enters the first combination groove 31a or the second combination groove 32a and attached to them. Hence, the annular rotating body 50 is rotated, and accordingly, the suspension chain 30 is circulated in the direction of the rotating of the annular rotating body 50.

As described above, the suspension chain 30 is circulated by pulling of the pull block 51, when the hanger support plate 31 departs from the path along which the pull block 51 rotates, the pull block 51 is detached from the first and second combination grooves 31a and 32a of the hanger support plate 31 or the chain link plate 32. At this time, the other pull block 51 pull another hanger support plate 31 or chain link plate 32. In this way, the suspension chain 30 continuously circulates.

Meanwhile, while the suspension chain 30 is circulating, the roller 34 of the suspension chain 30 is guided to the chain guide rails 111 and 112 so that stable circulation can be achieved.

In the above-described vertical rotary parking system according to the current embodiment of the present invention, since the pinion 201 rotates while touching externally the circumscribed gear 50a of the annular rotating body 50, a pitch circle is greater than that in a conventional parking system using a power delivery by an inscribed gear. Accordingly, force acting on a surface is reduced, and thereby tooth surface resistance and surface pressure resistance are increased.

Also, the first and second combination grooves 31a and 32a each coupled with the pull block 51 are formed in the hanger support plate 31 and the chain link plate 32, respectively, and a plurality of pull blocks 51 are used, and thus a connection break between the pull block 51 and each of the first and second combination grooves 31a
and 32a is minimized to thereby greatly reduce noise and vibration of the parking system.

The first and second combination grooves 31a and 32a each coupled with the pull block 51 are directly formed in the hanger support plate 31 and the chain link plate 32, respectively, and thus the parking system of the present invention can be easily manufactured with an increased manufacturing precision unlike the convention parking system manufactured using a method in which a dog is fixed to a hanger support plate by welding.

It will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention.

The present invention has advantages as follows.

First, the first and second combination grooves 31a and 32a each coupled with the pull block 51 are formed in the hanger support plate 31 and the chain link plate 32, respectively, and the plurality of pull blocks 51 are used. Thus, a connection break between the pull block 51 and each of the first and second combination grooves 31a and 32a is minimized to realize accurate engagement between the pull block 51 and each of the first and second combination grooves 31a and 32a, to thereby greatly reduce noise and vibration of the parking system.

Second, the first and second combination grooves 31a and 32a coupled with the pull block 51 are directly formed in the hanger support plate 31 and the chain link plate 32, respectively, and thus the parking system of the present invention can be easily manufactured with an increased manufacturing precision compared with the conventional parking system manufactured using a method in which a dog is fixed to a hanger support plate by welding.

Third, the pinion 201 rotates while touching externally the circumscribed gear 50a of the annular rotating body 50, and thus a pitch circle is greater than that in a conventional parking system using a power delivery by an inscribed gear. Accordingly, force acting on a surface is reduced, and thereby tooth surface resistance and surface pressure resistance are increased to realize stable driving.
Brief Description of Drawing

FIG. 1 is a schematic front view of a conventional parking system;
FIG. 2 is an enlarged view illustrating a major portion of the conventional parking system extracted from FIG. 1;
FIG. 3 is a perspective view illustrating a suspension chain adopted in the parking system extracted from FIG. 1;
FIG. 4 is a schematic front view of a parking system according to an embodiment of the present invention;
FIG. 5 is an enlarged view illustrating a major portion of the parking system extracted from FIG. 4;
FIG. 6 is a side view illustrating the parking system of FIG. 4;
FIG. 7 is an enlarged view illustrating a major portion of the parking system extracted from FIG. 4;
FIG. 8 is a perspective view illustrating a suspension chain adopted in the parking system extracted from FIG. 4; and
FIG. 9 is a cross-sectional view of the suspension chain.

<Explanation of Reference numerals designating the Major Elements of the Drawings>

30: suspension chain 31: hanger support plate
31a: first combination groove 50: annular rotating body
50a: circumscribed gear 51: pull block
60: annular fixing body 100: flame
111 and 112: chain guide rails 120: hanger
121: pallet 125: hanger guide rail
200: driving motor 201: pinion
CLAIMS

1. A vertical rotary parking system comprising: a suspension chain comprising a hanger support plate fixed to the suspension chain at a predetermined interval and circulating so as to form an endless track; a chain guide rail supported by a flame and guiding the suspension chain; a hanger supported by the hanger support plate and comprising a pallet on which a vehicle is loaded, an annular rotating body rotatably supported by the flame and comprising a pull block protruding outward from the annular rotating body; a driving motor rotating the annular rotating body; and a combination unit coupled with the hanger support plate so that the pull block goes in and out,

wherein the combination unit comprises a concave first combination groove formed on the end of the hanger support plate and having the same shape as a combination portion of the pull block.

2. The system of claim 1, wherein the suspension chain comprises the hanger support plate and a chain link plate, which are alternately connected by a link pin so as to be rotated, and a second combination groove is coupled with the chain link plate so that the pull block goes in and out.

3. The system of claim 1 or 2, wherein a circumscribed gear is formed on an outer circumference of the annular rotating body, and a pinion, which is rotated by power of the driving motor, is interlocked with the circumscribed gear so as to rotate the annular rotating body.
FIG. 2
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC®: E04H 6/14 (2006.01); B66B 9/10 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC.

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC®: B65G; B66B; E04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC; WPI; PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<td>US 2004/01 56699 A1 (DaI Young Park) 12 August 2004 (12.08.2004) \abstract; fig. 4 and 12\</td>
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<td>A</td>
<td>JP 8184211 A (Nissei Ltd.) 16 July 1996 (16.07.1996) \abstract and fig. 1 and 2. [online] [retrieved on 2007-03-06]. Retrieved from: EPOQUE PAJ Database\</td>
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LJ Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
  "A" document defining the general state of the art which is not considered to be of particular relevance
  "E" earlier application or patent but published on or after the international filing date
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  "P" document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search
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