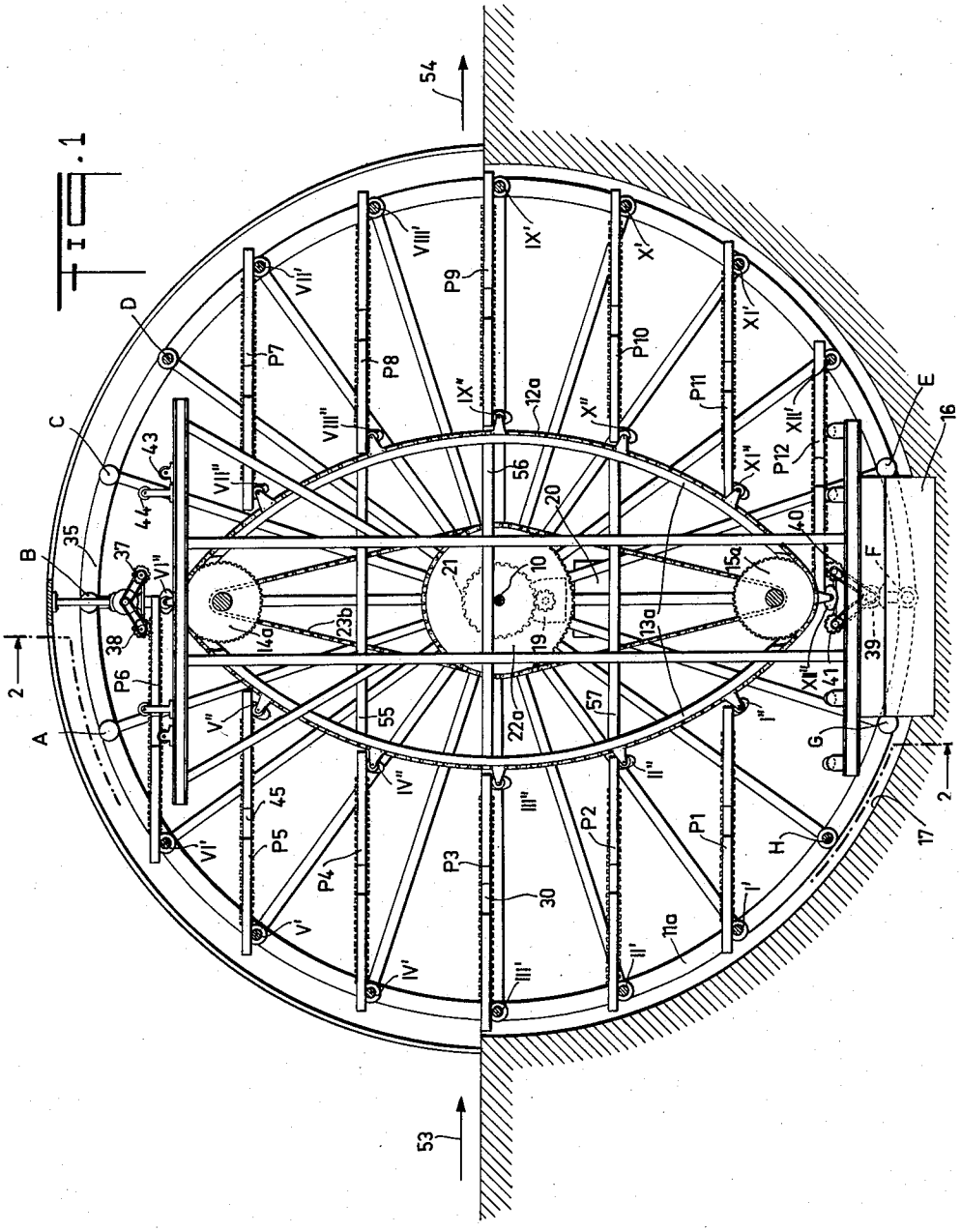
June 10, 1958 J. SCHULTE 2,838,187

PARKING WHEEL

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FIG. 2

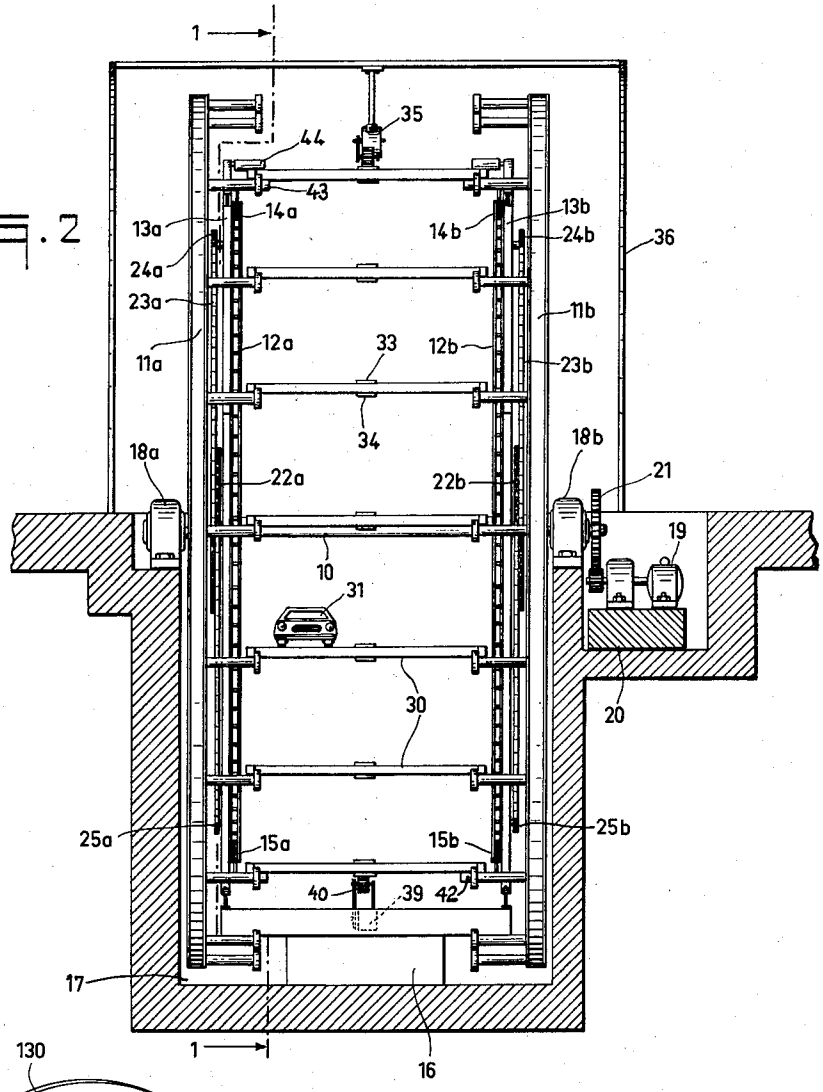
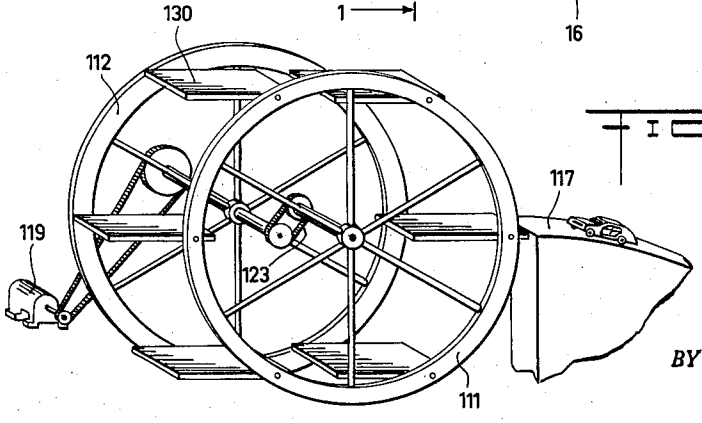


FIG. 5



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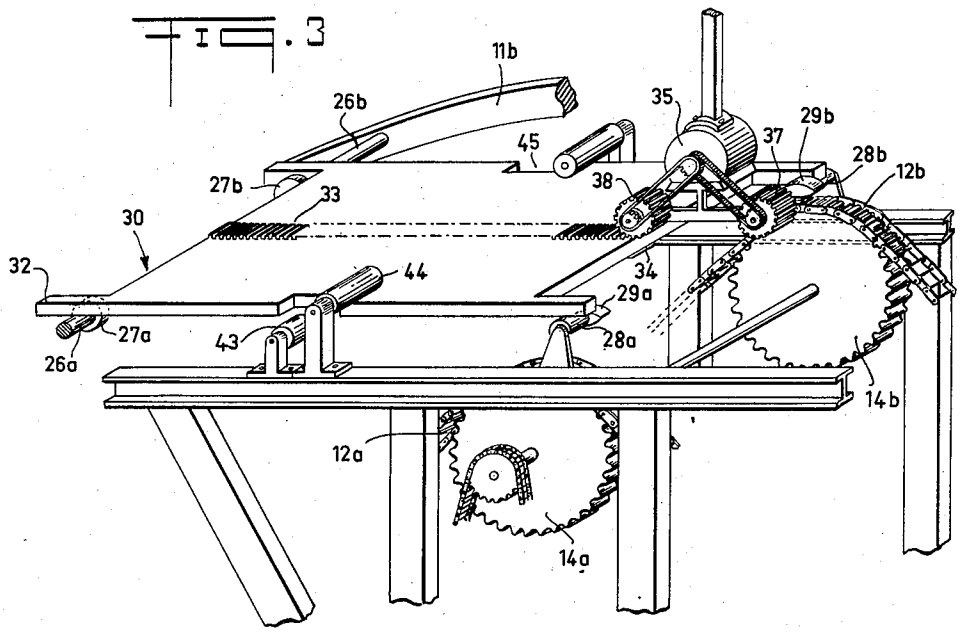
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FIG. 3



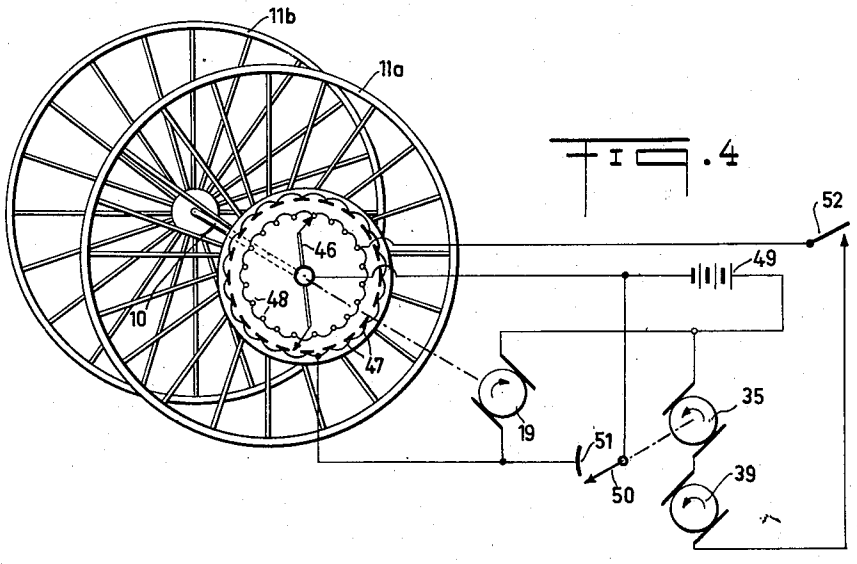


FIG. 4

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PARKING WHEEL

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13 Claims. (Cl. 214—16.1)

My present invention relates to a parking device for automobiles and other vehicles of the type comprising a structure in the shape of a Ferris wheel provided with a number of platforms or carriers to support the vehicles.

Previously proposed systems of this character utilize gondola-type carriers which, aside from occupying considerable space, require special stabilizing means to maintain them in horizontal position during rotation of the wheel. My present invention has for its object the provision of a novel parking wheel affording maximum economy of space, relatively simple construction and easy access for the loading and unloading of the vehicles.

A feature of my invention resides in the provision of a pair of endless annular members in combination with drive means for so synchronizing their movement in a vertical plane that corresponding points thereof maintain like elevation and approximately the same relative horizontal spacing throughout substantially a full revolution of at least one of these members, each platform being supported on a pair of such points so as to occupy a horizontal position during its movement.

In order to obtain a particularly compact assembly, I prefer to arrange the two members concentric with each other, one of these members (usually the outer one) being circular while the other may be composed of two arcuate sections each with the same radius as the circular member. With such arrangement there will exist two special positions, at the zenith and the nadir of the inner concentric member, where the parallelism between the platform-supporting points ceases and means must be provided for transferring each platform from the ascending to the descending portion of its path, or vice versa, without material departure from its horizontal position. Such means may include, in accordance with a more particular feature of my invention, stationary supports for the highest and for the lowest platform as well as mechanism for transporting the platforms across these supports during a pause in the rotary movement of the concentric members.

The invention will be described in greater detail with reference to the accompanying drawing in which:

Fig. 1 is a side-elevational view of a parking wheel embodying the invention, taken in section on the line 1—1 of Fig. 2;

Fig 2 is an end-elevational view of the apparatus shown in Fig. 1;

Fig. 3 is an enlarged perspective view of the upper transport mechanism of the apparatus shown in Figs. 1 and 2;

Fig. 4 is a circuit diagram for the apparatus of the preceding figures; and

Fig. 5 is a perspective view of a modified apparatus embodying the invention.

The apparatus illustrated in Figs. 1–4 comprises a horizontal shaft **10** around which there are rotatable a pair of axially spaced wheels **11***a*, **11***b*, the peripheries of these wheels representing a first annular member, as well as a pair of endless chains **12***a*, **12***b* together representing a second annular member concentric with the wheels **11***a*, **11***b*. Chain **12***a* is guided on a pair of rails **13***a* whose radius of curvature equals that of wheels **11***a*, **11***b* and whose centers of curvature are quidistant from and on opposite sides of shaft **10** on a horizontal plane passing through this shaft; chain **12***b* is guided on a pair of similar rails **13***b*. The rail pairs **13***a* and **13***b* terminate short of the points of intersection of their arcs, the resulting gaps being occupied at their zenith by upper sprockets **14***a*, **14***b* and at their nadir by lower sprockets **15***a*, **15***b* engaging the chain **12**, **12***b*.

The rails **13***a*, **13***b* and other stationary parts of the apparatus are supported on a base **16** received in a semicircular pit **17** which accommodates the lower halves of wheels **11***a* and **11***b*. Shaft **10** is lodged in bearings **18***a*, **18***b* so as to be approximately on the ground level at the top of the pit, rotation being imparted to this shaft by a principal driving motor **19** via gears **20**, **21**. Shaft **10** carries, next to the wheel hubs, two sprockets **22***a*, **22***b* which are connected through respective driving chains **23***a*, **23***b* with sprockets **24***a*, **24***b* and **25***a*, **25***b* keyed to the same shafts as the sprockets **14***a*, **14***b* and **15***a*, **15***b*, respectively.

The sprockets **22***a*, **22***b* and **24***a*, **24***b*, **25***a*, **25***b* are so dimensioned that the angular speed of chains **12***a*, **12***b* along their curved paths **13***a*, **13***b* equals the speed of rotation of wheels **11***a*, **11***b* whereby corresponding points on the chains and on the wheel peripheries will rise and fall at the same rate so as to occupy like levels on either the ascending or the descending portion of their run. In Fig. 1, certain of these points have been designated I′, II′, . . . XII′ on the wheels and I″, II″, . . . XII″ on the chains. Points I′, II′ etc. mark the location of supporting arms **26***a*, **26***b* which extend from the rims of wheel **11***a*, **11***b* and terminate in roller-shaped heads **27***a*, **27***b*, respectively (Fig. 3), points I″, II″ etc. similarly mark the location of supporting arms **28***a*, **28***b* which are secured to the chains **12***a*, **12***b* and have extremities in the form of hammer heads **29***a*, **29***b* respectively.

In the position shown in Fig. 1, each wheel-borne supporting point I′, II′ etc. has the same elevation as the corresponding chain-borne supporting point I″, II″ etc. Since these supporting points are uniformly spaced on the wheels and on the chains, and since the perimeters of the wheels are longer than the chains, there are additional locations A, B, C, D and E, F, G, H where the wheels carry further supporting arms **26***a*, **26***b* which, however, have no counterparts on the chains. The paired supports I′—I″, II′—II″ etc. carry vehicular platforms **30** whose construction has been shown in detail in Fig. **3** and which have been designated P1 . . . P12 in Fig. 1.

As will be apparent from Fig. 2, each platform **30** is wide enough to accommodate two vehicles **31** (only one shown). Suitable stops, not shown, are of course provided to keep these vehicles immobilized when the apparatus is in motion. As best seen in Fig. 3, each platform **30** has four legs **32**, normally resting on respective supporting arms **26***a*, **26***b* and **28***a*, **28***b* whose heads **27***a*, **27***b* and **29***a*, **29***b* prevent the platform from sliding off its supports; at the zenith and nadir positions, however, the hammerheads **29***a*, **29***b* on the inner supports are horizontal so that sliding of the platform across the apices of chains **12***a*, **12***b* is possible. For this purpose the platform is provided with an upper rack **33** and a lower rack **34** bisecting it longitudinally. Such sliding movement is brought about by a transport mechanism which for the upper platform position (Fig. 3) comprises a motor **35**, suspended from a stationary frame **36** along with two pinions **37**, **38** chain-driven from this motor, and which for the lower platform position comprises a motor **39** supported on the base **16** together with its chain-driven pinions 40, 41. Motors 35, 39 and their

associated pinions are positioned substantially in a median plane of the apparatus so as not to interfere with the placement of vehicles 31 on the platforms 30.

In order to support the platforms 30 during transfer, I provide a set of rollers 42 at the lower transfer station and two sets of rollers 43, 44 at the upper station. Rollers 43 are so positioned that the longitudinal edges of platform 30 come to rest on them just before the outer legs 32 thereof leave the supporting arms 26*a*, 26*b*; these edges are provided with central recesses 45 which clear the rollers 43 the latter overlying the edges of the platform so as to prevent its tilting about the inner supporting arms 28*a*, 28*b*.

The circuit arrangement shown in Fig. 4 is provided to insure automatic operation of the transfer motors 35, 39 and interruption of the operation of main driving motor 19 whenever two platforms reach their extreme positions at the top and at the bottom of the array. It will be observed that two other platforms 30 are at the same time level with the ground so that loading and unloading will be possible. As shown in Fig. 4, shaft 10 (driven from motor 19) carries or is coupled with a wiper 46 of a rotary switch having interconnected outer bank contacts 47 and interconnected inner bank contacts 48 whose positions of engagement by wiper 46 alternate with those of contacts 47. The circuit of motor 19, comprising a source of current here shown schematically as a battery 49, includes wiper 46 and contacts 47 in series so as to be closed whenever this wiper stands on one of its outer contacts. An alternative energizing circuit for this motor includes a rotary switch consisting of a wiper 50 and a single bank contact 51. Wiper 50 is driven from motor 35 which, together with motor 39, is energizable in a circuit including battery 49, wiper 46, inner contacts 48 and a manual circuit breaker 52 in series.

The operation of the system shown in Figs. 1–4 is as follows:

With the circuit breaker 52 open, the apparatus is assumed to be in the position shown in Figs. 1 and 2 in which platform P3 is at ground level to receive vehicles as indicated by arrow 53, platform P9 is also at ground level to discharge vehicles as indicated by arrow 54, and platforms P6 and P12 have just arrived at the upper and the lower transfer position, respectively. One end of wiper 46 has just reached the narrow gap between two outer contacts 47, thereby de-energizing the motor 19 in the position described, while its other end stands on an inner contact 48. It will be apparent from Fig. 3 that the movement of arms 26*a*, 26*b* just ahead of their illustrated position has a distinctly horizontal component which serves to push the rack 33 of platform P6 under the pinion 38; in like manner the lower rack 34 of platform P12 has been brought into engagement with pinion 40. When the circuit breaker 52 is now closed, motors 35 and 39 operate to move platform P6 over from support VI' onto the hitherto unoccupied support D and to shift the platform P12 from support XII' onto idle support H. Toward the end of this movement the motor 35 brings switch arm 50 into engagement with contact 51 so that motor 19 is energized and restarts the rotation of shaft 10, wiper 46 leaves its contact 48 so as to inactivate the auxiliary motors 35 and 39, and the wheels 11*a*, 11*b* as well as the chains 12*a*, 12*b* continue to rotate until the next platforms P5, P11 have reached the zenith and nadir positions, respectively. If the circuit breaker 52 is held closed, the system will stop only long enough to allow transfer motors 35, 39 to go through a full operating cycle whereupon rotation resumes as before. If the circuit breaker 52 is opened at any time while the system is in motion, the apparatus will come to rest as soon as the wiper 46 reaches the next gap between contacts 47 and two diametrically opposite platforms 30 are in their ground-level positions.

For a still better utilization of the available parking space, I provide additional, stationary platforms 55, 56, 57 to which access may be had via the rotating platforms 30 while the apparatus is at standstill.

In Fig. 5 I have shown a modified structure according to the invention in which the platforms 130 are supported on two identical wheels 111, 112 positioned in parallel vertical planes. Diagonally opposite ends of the platforms are pivotally linked with the peripheries of the two wheels which are driven in unison by means of a motor 119 and a chain link 123. A ramp for the loading and/or unloading of vehicles has been shown at 117. With this arrangement no transfer mechanism is necessary, the platforms 130 automatically maintaining their positions in any angular position of the wheels 111, 112. Motor 119 is controlled for intermittent operation, by means not illustrated, to arrest the wheels 111, 112 whenever a desired platform 130 reaches the ramp 117.

My invention is, of course, not limited to the specific embodiments described and illustrated but may be realized in various modifications and adaptations without departing from the spirit and scope of the appended claims. Thus, it will be understood that the apparatus shown in Fig. 5 may be disposed in a recess similar to pit 17, with its wheel hubs at or near the ground level, or that one or more ramps as shown in Fig. 5 may be provided with the arrangement of Figs. 1–4, and that loading and/or unloading need not necessarily be confined to platforms positioned in line with the wheel axes. It will also be appreciated that the transfer mechanism 35, 37, 38 and 39, 40, 41 in the first embodiment may be omitted if some of the platforms 30 are eliminated, e. g. those designated P1, P2 and P7, P8, and rotation of the wheels 11*a*, 11*b* is limited to a quarter of a revolution in each direction, the mouth of pit 17 on each side of the apparatus then serving as both a loading and an unloading station for the vehicles to be received by the remaining platforms P3—P6 and P9—P12, respectively.

I claim:

1. A parking device comprising an outer and an inner endless member rotatable along orbits centered on a common horizontal axis, a plurality of movable vehicle-carrying platforms, means for releasably supporting opposite extremities of said platforms on said outer and inner members, respectively, coupling means interconnecting said members for rotation in unison at a relative speed maintaining said platforms approximately horizontal throughout substantially a full revolution of said inner member, means defining a horizontal path for said platforms extending across the upper and the lower apex of said inner member, mechanism operative in a zenith and a nadir position of each platform to disengage same from said members and to transport said platforms across said horizontal paths and into re-engagement with said members, and drive means for intermittently rotating said members.

2. A parking device according to claim 1, wherein said drive means is arranged to arrest said members in the zenith and nadir positions of each platform.

3. A parking device according to claim 2, comprising circuit means for activating said mechanism in the arrested condition of said members only.

4. A parking device according to claim 2, comprising a loading station adjacent the path of said platforms, the position of said station being level with one of said platforms in positions in which certain of said platforms are in said zenith and nadir positions.

5. A parking device according to claim 1, further including at least one stationary platform positioned inside said inner member and accessible by way of said movable platforms.

6. A parking device according to claim 1, wherein said mechanism includes rack means on said platforms and fixedly positioned gear means engageable with said rack means.

7. A parking device according to claim 6, wherein said

rack means includes a first rack on the upper surface and a second rack on the lower surface of each platform, said platforms being each adapted to receive at least two vehicles side by side with said first rack between them.

8. A parking device according to claim 1, wherein said outer member is circular and said inner member comprises two arcuate sections each with a radius of curvature substantially equal to the radius of said outer member, the centers of curvature of said sections being horizontally offset from said common axis.

9. A parking device according to claim 8, wherein said inner member comprises an endless chain provided with guide means extending along said arcuate sections.

10. A parking device according to claim 9, wherein said guide means include two stationary rails terminating short of the points of intersection of said arcuate sections, said rails forming gaps at the upper and lower apices of said chain, and two sprockets occupying at least a substantial part of said gaps.

11. A parking device according to claim 10, wherein at least one of said sprockets is positively coupled with said drive means for entrainment of said chain.

12. A parking device according to claim 1, wherein said outer member comprises a pair of parallel wheels and said inner member comprises a pair of endless chains substantially positioned in the planes of said wheels.

13. A parking device according to claim 1, further comprising guide means defining a pair of arcuate path sections for said chains, said path sections intersecting above the upper and below the lower apices of said chains and having radii of curvature substantially equal to the radii of said wheels.

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