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(54) **WATER-RIDE FACILITY**

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(57) **ABSTRACT**

A watercraft is described for a water-ride facility. The watercraft consists of a floating body **10**, which is connected by an articulated connecting unit **20** to the undercarriage **30**, in such a way that the position of the floating body **10** can be modified in the longitudinal and transverse directions, relative to the undercarriage, and can be modified with respect to its height, with the result the floating body **10** can execute rocking, swaying, and rolling movements comparable to a freely floating boat, despite being guided by the undercarriage **30**. The undercarriage **30** is guided by means of rails **40** that are fixed in position. Outside of the water the floating body **10** can be firmly attached to the undercarriage **30** by means of coupling elements **14** and **34**.

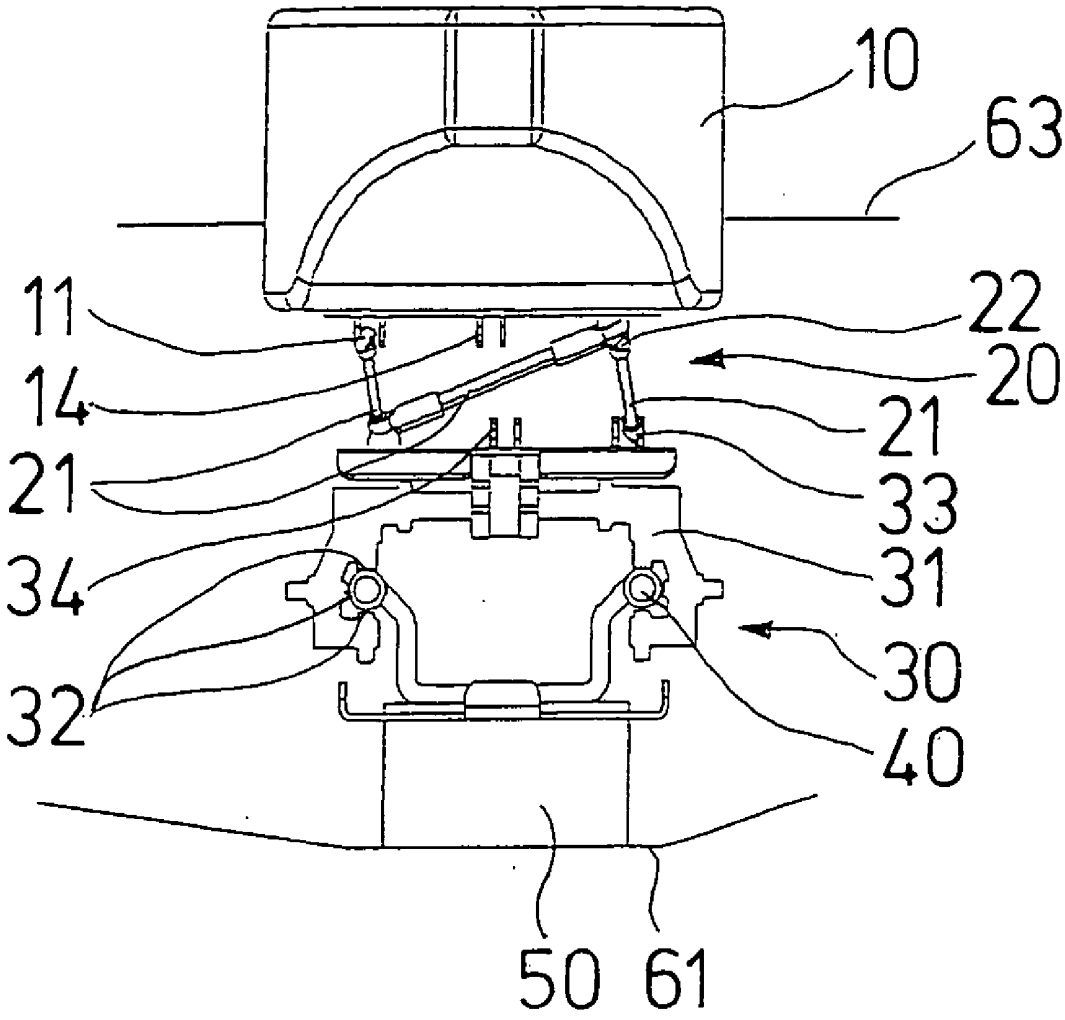


FIG 1

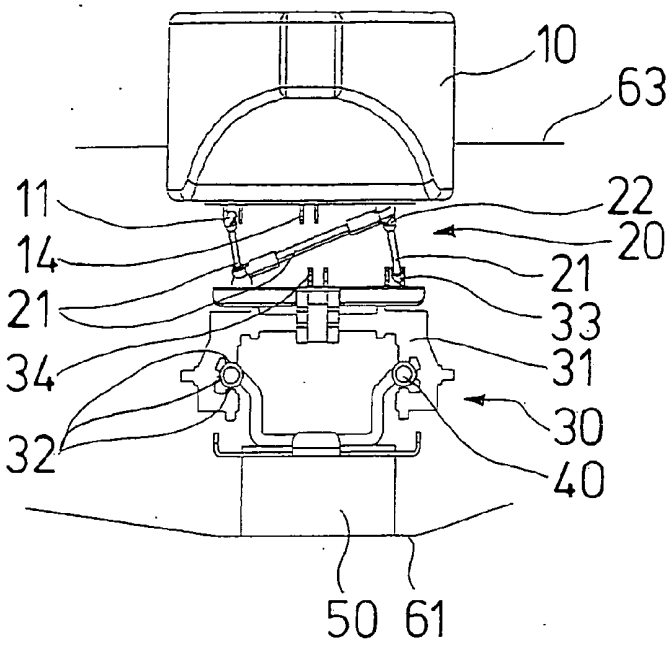


FIG 2

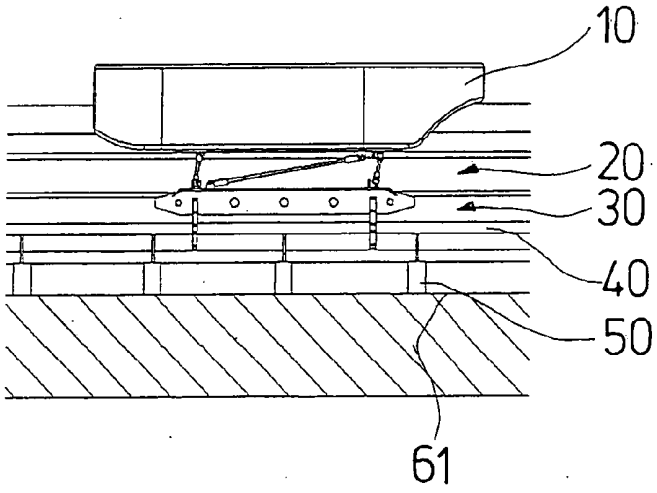


FIG 3

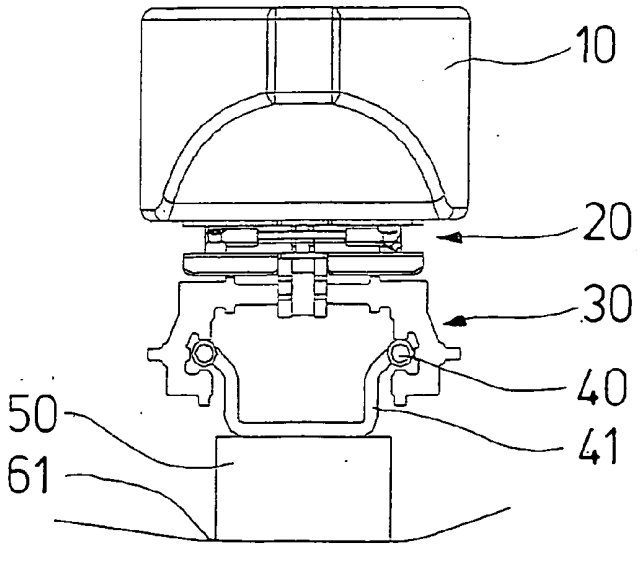


FIG 4

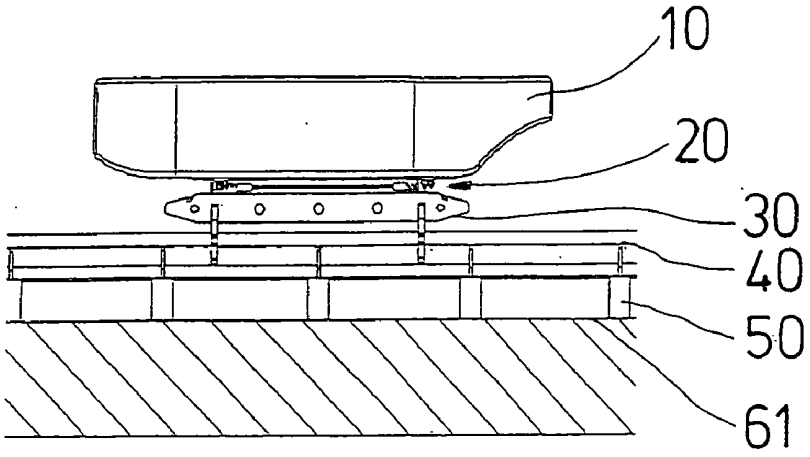


FIG 5

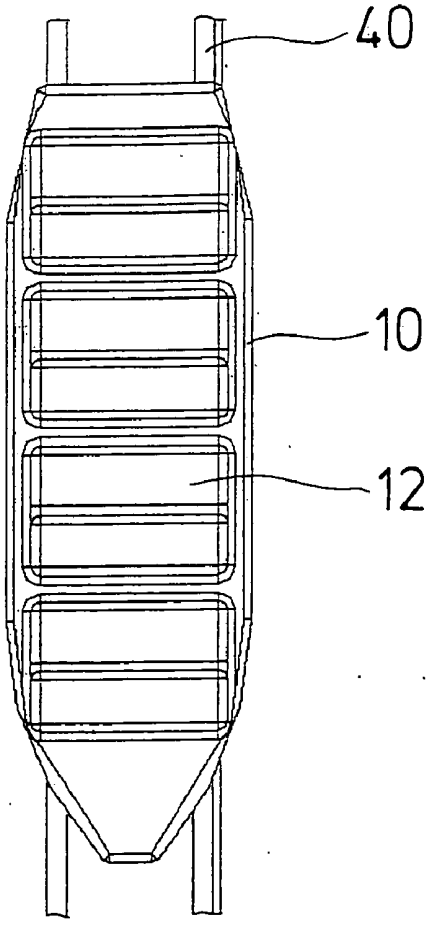
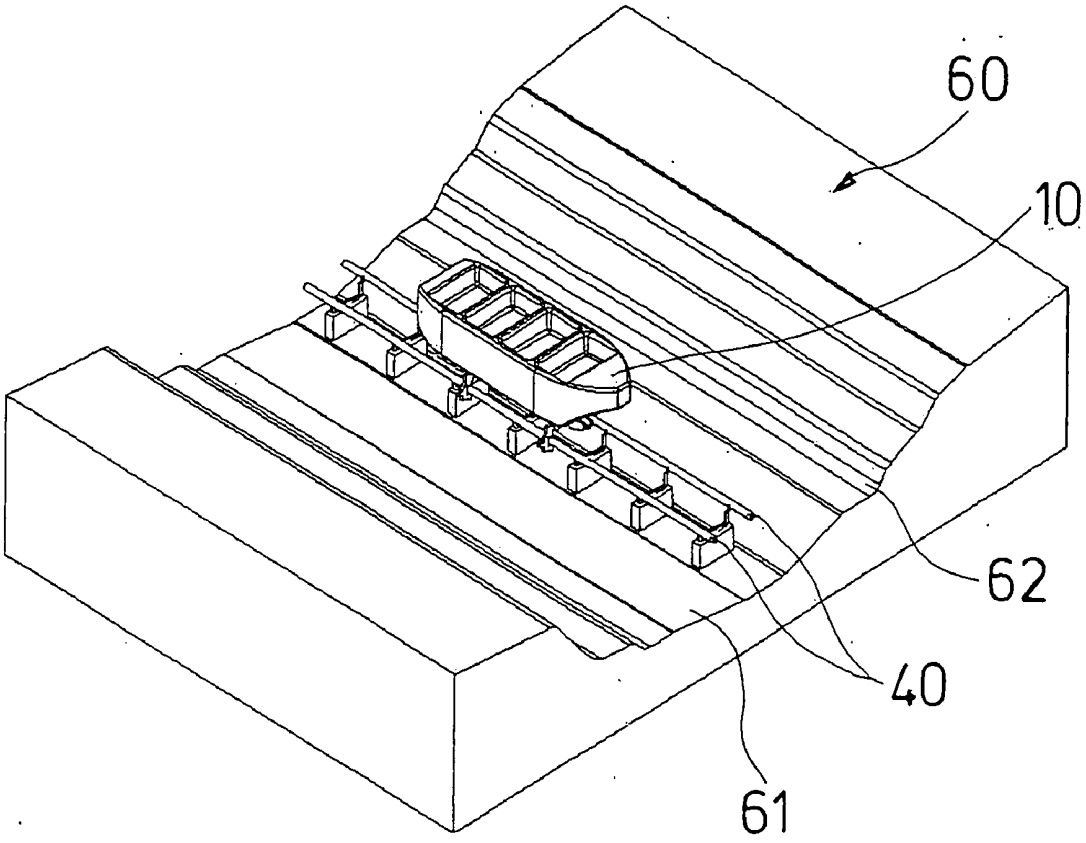


FIG 6



WATER-RIDE FACILITY

DESCRIPTION

[0001] The invention relates to a water-ride facility of the type indicated in the preamble of claim **1**.

[0002] Rides of this kind, which are very popular in leisure parks, provide water lanes, including ones of a type resembling roller coasters, with a pre-established path for a watercraft, e.g., a boat or similar floating body.

[0003] In order to give the passenger as a realistic as possible a sense of boat travel the watercraft should float freely in the areas containing water.

[0004] In order to achieve this end, the watercraft are usually guided in channels which are made, at least in part, of concrete or plastic and which are powered by drives that are most often provided under the surface of the water. This drive may be a wire cable guided in different directions over guide rollers, such that the floating body of the watercraft, which is attached to this wire cable, is pulled through the water. Furthermore, the vessel may be driven by local current pumps or by means of the channel gradient.

[0005] Also known are white-water lanes, which are designed like roller coasters. Here the watercraft pass through a schuss section and reach an area of water located at a lower elevation. Since the vessel is exposed to high forces and high load changes, safety is of special importance in the schuss section. Consequently the floating body of the watercraft is firmly attached to an undercarriage that is guided by rails, at least in the area of the schuss section.

[0006] In order to realize an operation that is as naturalistic as possible, the undercarriage of the watercraft can leave the guide system after the schuss section has been traversed, with the result that the watercraft floats more or less freely inside of the channel.

[0007] To be sure, controlling the vessel inside this area, particularly given a varying load on the boat, is problematic, or at least extraordinarily costly. It is also impossible to prevent the watercraft from colliding with the channel walls during operation, and this fact disrupts the passenger's sense that the vessel is floating freely.

[0008] Threading the undercarriage into the guide mechanism after leaving behind the area in which the watercraft floats freely is particularly difficult. No less problematic is unthreading the undercarriage after passing through a schuss section, since for reasons of safety this can only occur if the floating body has stabilized after entering the water. For example, forces that arise after the craft enters the water can be used to only a limited degree in influencing the travel effect.

[0009] The continuous guidance of an undercarriage firmly attached to the floating body is generally preferred across the entire body of water, and for the reasons indicated above, though the price paid for this is that the floating motion of the vessel body is comparatively unrealistic.

[0010] It is true that DE 298 23 591 U1 describes a watercraft in which a floating body is connected in a flexible manner to an undercarriage acting as a guide unit. However, this flexible connection does not make it possible for the floating body to float naturalistically.

[0011] The present invention is based on the problem of creating a water-ride in which the watercraft is safely conducted in all areas, including schuss sections where there are large differences in elevation, and the floating body nonetheless executes largely naturalistic movements in the remaining areas of water, even given a varying load and a varying water level, and the unnaturalistic guidance of the vessel through the water channel is eliminated.

[0012] According to the invention as characterized in claim **1**, this problem is solved in that the floating body is connected to the undercarriage, which serves as a guide unit, by a connecting unit exhibiting flexible or articulated elements and permitting the floating body to execute limited transverse or lifting motions relative to the undercarriage.

[0013] In this solution the floating body can execute rocking and rolling movements typical of travel by boat, and it can adapt to different water levels, while being safely conducted over the entire course of the trip.

[0014] If the watercraft is to pass through a schuss section, the floating body, in accordance with a basic idea of the invention, is firmly connected to the carriage for a given period of time. In accordance with the proposal according to claim **2**, consequently, coupling elements that are assigned to one another and that lock together are provided on the floating body and on the undercarriage; these coupling elements serve to create the firm connection between the floating body and the undercarriage in at least one relative position. In this way the watercraft is safely guided during schuss sections that resemble a roller-coaster, but has the realistic characteristics of a freely floating boat when the water section is reached.

[0015] Since the watercraft can be designed with an undercarriage typical of roller-coasters, it is able to pass through typical roller-coaster sections, such as schusses, loops, Immelmann curves, horseshoe curves, lifts, helical curves, and the like, despite having the typical characteristics of a freely floating boat. The important factor here is an absolutely secure lock between the coupling elements, e.g., by means of redundant locking and/or dead-center locking, as suggested in claim **7**. Also suitable are coupling elements designed as king pins and pivot bearings, such as those used in trucks to connect a semi-trailer truck and a semi-trailer.

[0016] Particularly useful are the coupling elements proposed in claim **3**, which utilize the force of gravity and are so designed that, given an appropriate track layout, the floating body, upon dropping onto the undercarriage, will automatically connect with the undercarriage and preferably will lock with it. The locking mechanism here will permit controlled unlocking.

[0017] A large range of possibilities presents itself for designing the connecting unit that is employed to connect the floating body to the undercarriage.

[0018] In accordance with the proposal made in claim **4**, the flexible connecting unit may consist joint rods, telescope bars, linear guides, or also a rotating assembly, arranged to form transverse and longitudinal guides.

[0019] A flexible connection is the subject matter of claim **5**, according to which the flexible elements of the connecting unit can be cords, chains, belts, or air pillows.

[0020] To actuate these connecting elements, hydraulic or pneumatic cylinders are suitable, as are cable feeds in the case of cables or the like, e.g., in the form of motor-driven cable drums, which preferably will be controllable. This is proposed in claim **6**.

[0021] Likewise, an entire spectrum of possibilities is available for embodying the floating body. Suitable for this are boats with a single or multiple fuselage, e.g., catamarans or rafts, as per claim **8**. In accordance with claim **9**, the boats can take the form of sailboats, motorboats, or rowboats.

[0022] In accordance with claim **10**, all known drives are suitable for the water-ride facility according to the invention, e.g., cable drives or conveyor chain drives that are connected to the vehicle; friction gear drives or gearwheel drives provided on the guidance system; and fluid drives, particularly fluid pump drives, in accordance with claim **13**, where controllable outlet nozzles preferably will be provided in the water, i.e., below the surface of the water, close to the guidance system. Finally, it is possible to use induction drives, particularly linear induction motor drives, in accordance with claim **13**.

[0023] When the layout includes schuss sectors, the watercraft can be driven by gravity.

[0024] Many maneuvers and effects can be realized when these technical possibilities are made use of.

[0025] Depending on the requirements, the guidance system may consists of a rail, as in monorail tracks, or of rail forms that are typical of roller-coasters, where running and support wheels—provided on the undercarriage and resting in rolling fashion on the tracks, even during the execution of complicated curves and loops—provide for an always secure connection. This is indicated in claim **16**.

[0026] In the water-ride facility according to the invention, controllable braking devices which can be positioned either on the undercarriage or on the guidance system will provide for the necessary reduction in speed and for bringing the craft to a defined stop.

[0027] The subject matter of the invention is next described in detail on the basis of a preferred exemplary embodiment, which is schematically depicted in the drawings. Shown in the drawings are:

[0028] **FIG. 1**

[0029] Front view of the watercraft according to the invention, on a guide rail typical of roller coasters, showing the floating body while it is floating

[0030] **FIG. 2**

[0031] Reduced-scale lateral view of the watercraft of **FIG. 1**, inside a channel

[0032] **FIG. 3**

[0033] Front view of the watercraft of **FIG. 1**, outside of the water

[0034] **FIG. 4**

[0035] Reduced-scale lateral view of the vehicle of **FIG. 3**

[0036] **FIG. 5**

[0037] Top view of the watercraft

[0038] **FIG. 6**

[0039] Perspective view of a section through the water-ride facility according to the invention

[0040] The watercraft according to the invention consists of a floating body **10** designed in the form of a boat. The floating body **10** is connected to the undercarriage **30** by means of an articulated connecting unit **20**. With its running and support wheels, which have a pivoted mounting in the chassis **31** and are only suggested in the drawing, the undercarriage **30** rests on parallel tubular rails **40**, which are connected to the base pedestal **50** of the water-ride facility by means of rail supports **41**.

[0041] In the depicted exemplary embodiment the connecting unit **20** consists of joint rods **21**, which are designed and positioned in the manner of transverse and longitudinal guides. The ball-shaped heads **22** of these joint rods **21** are pivot-mounted on all sides in corresponding bearings **11** and **33**, which belong to the floating body **10** or the undercarriage **30**.

[0042] Provided on the lower side of the floating body **10** and on the upper side of the undercarriage **30** are matching coupling elements **14** and **34** which connect with each other and lock together. The joints rods **21** and the bearings **11** and **33** for the ball-shaped heads are so dimensioned and positioned that the coupling elements **14** and **34** engage with each other when the floating body **10** drops. This is depicted in **FIGS. 3 and 4**. In this position the floating body **10** can be firmly connected to the undercarriage, so that the vessel is able to pass through all the conceivable curves and slopes of a roller coaster without difficulty.

[0043] In the positions shown in **FIGS. 1 and 2**, on the other hand, the articulated connecting unit **20** permits the floating body **10** to execute relative movements vis-à-vis the undercarriage **20**, so that, like a boat that is floating freely, the floating body can execute the rocking and rolling movements typical of a floating body, even given varying water levels **63** and varying loads.

[0044] Consequently, the floating body **10**, whose passenger seats **12** are indicated in **FIG. 5**, can be conducted through the water in a naturalistic manner by means of the undercarriage **30** and the rails **40** that are located beneath the surface of the water **63**.

[0045] As depicted in **FIG. 6**, the body of water can be a water channel **60**, which is bordered by the channel floor **61** and the channel walls **62**. The body of water can also take the form of a large-scale lake or a winding river.

LIST OF REFERENCE NUMERALS

[0046] **10** floating body

[0047] **11** ball-headed bearing

[0048] **12** passenger seats

[0049] **14** coupling element

[0050] **20** connecting unit

[0051] **21** joint rods

[0052] **22** ball-shaped head

[0053] **30** undercarriage

[0054] **31** chassis

[0055] **32** running and support wheels

[0056] **34** coupling element

[0057] **40** guide rails

[0058] **41** rail supports

[0059] **50** base pedestal

[0060] **60** channel

[0061] **61** channel floor

[0062] **62** channel wall

[0063] **63** surface of water

1. A water-ride facility, consisting of at least one watercraft, which exhibits a floating body, as well as of an undercarriage which is connected to the floating body and which serves as a guidance unit, and consisting of a guidance system running in the water for the undercarriage, and a drive for the watercraft, wherein the floating body (**10**) is connected to the undercarriage (**30**) by a connecting unit (**20**) exhibiting joint rods (**21**) and/or flexible elements, and said connecting unit (**20**) permits the floating body (**10**) to execute a transverse and/or lifting movement relative to the undercarriage (**30**).

2. A water-ride facility according to claim 1, wherein reciprocally matching coupling elements (**14**, **24**), which interlock and which provide a rigid connection between the floating body (**10**) and the undercarriage (**30**) in at least one relative position, are positioned on the floating body (**10**) and the undercarriage (**30**).

3. A water-ride facility according to claim 2, wherein the coupling elements are designed in such a way that upon dropping onto the undercarriage (**30**) the floating body (**10**) will automatically lock, in such a way that the locking mechanism can be released in controllable fashion.

4. A water-ride facility according to claim 1, wherein the connecting unit (**20**) consist of joint rods (**22**, **23**), telescope bars, linear guides, or rotating assemblies, which form transverse and longitudinal guides.

5. A water-ride facility according to claim 1, wherein the flexible elements are cables, chains, belts, or air pillows.

6. A water-ride facility according to claim 4, wherein the flexible and/or articulated elements are connected to hydraulic or pneumatic cylinders, or to cable feeds, and will preferably be controllable.

7. A water-ride facility according to claim 2, wherein the coupling elements exhibit a redundant locking system and/or a dead-center locking system, or are designed in the form of a king pin and pivot bearing.

8. A water-ride facility according to claim 1, wherein the floating body (**10**) is boat with a single or multiple fuselage, or is a floating body.

9. A water-ride facility according to claim 8 wherein the boat is a sailboat, a motorboat, or a rowboat.

10. A water-ride facility according to claim 1, wherein cable or conveyor chain drives are mechanically connected to the craft.

11. A water-ride facility according to claim 1, wherein there is a friction gear drive or a gearwheel drive.

12. A water-ride facility according to claim 1, wherein there is a current drive, preferably a current pump drive with outlet nozzles positioned within the water and close to the guidance mechanism.

13. A water-ride facility according to claim 1, wherein there are induction drives, particularly linear induction motor drives.

14. A water-ride facility according to claim 1, wherein the guidance system exhibits schuss sections in which the watercraft is driven by gravity.

15. A water-ride facility according to claim 1, wherein the guidance system consists of one or more, but preferably two, rails.

16. A water-ride facility according to claim 1, wherein running wheels or support wheels (**32**), which roll along the guide rails (**40**), are provided on the undercarriage (**30**).

17. A water ride facility according to claim 1, wherein braking devices are positioned on the undercarriage and/or on the guidance mechanism.

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