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(54) Benævnelse: **APPARAT TIL BEVÆGELSE AF ET LEDESKINNEAFSNIT I ET LEDESKINNESYSTEM TIL KØRETØJER I EN KØRENDE FORLYSTELSE**

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The present invention relates to a device for moving back and forth a guide track section of a guide track system for vehicles of a fun fair ride from a first guide track connection part to a second guide track connection part which is arranged at a distance from the first guide track connection part, wherein the first and the second guide track connection parts are part of the guide track system.

Fun fair rides are a fixed part of fairs or amusement parks. In particular roller coasters, which comprises a guide track system which has elevations, drops and loops and through which aa number of vehicles travel, in part at very high speeds, are especially popular.

DE 101 35 365 A1 shows a guide track section of a roller coaster which can be rotated between two inclined guide track connection parts about a fixed, substantially horizontally running axis of rotation. In a first position, the guide track section is positioned in such a manner that it is aligned with the first guide track connection part so that a vehicle that receives the passengers can ride up onto the rotatable guide track section above the first guide track connection part and stops on it. Subsequently, the guide track section is rotated about the axis until the guide track section is aligned with the second guide track connection part. Subsequently, the vehicle is again put in motion and continues its travel.

Further fair rides are disclosed in DE 10 2014 101 007 B3, US 2007/0074638 A1, DE 101 35 368 A1, DE 10 2013 222 910 A1 and JP 2001/120 842 A.

The attractiveness of such a fun fair ride depends, among other things, also on which surprising movements the vehicles can make when traveling through the guide track system. Consequently, the present invention has the problem of further developing a fun fair ride of the initially described type with relatively simple means in such a manner that the vehicle can make a surprising and not foreseeable movement.

This problem is solved with the features indicated in Claims 1 and 12. Advantageous embodiments constitute subject matter of the subclaims.

An embodiment of the invention relates to a device for moving back and forth a guide track section of a guide track system for vehicles of a fun fair ride from a first guide track connection part to a second guide track connection part arranged at a distance from the first guide track connection part, wherein the first and the second guide track connection parts are part of the guide track system, comprising a guide track section onto which at least one of the vehicles can travel, a carrier structure for carrying the guide track section, a guide structure which has an active connection with the carrier construction and with which the carrier structure can be guided in such a manner that the guide track section can be moved back and forth from the first guide track connection part to the second guide track connection part along the guide structure, and comprises a drive device for moving the carrier structure along the guide structure, wherein the carrier structure comprises means for making another movement of the guide track section in addition to the movement along

the guide structure. It is mentioned at this point that the guide track section does not have to be moved directly between the first and the second guide track connection. Rather, the second guide track connection part can be passed at first before a reversal of the direction of movement takes place in order to arrive then at the second guide track connection part. In addition, not only a first and a second guide track connection part can be provided but rather several of them. In addition, it should be made clear that the means can be designed in such a manner that it can make a single further movement or several further movements depending on which movement pattern should be generated. According to this embodiment of the invention, a vehicle can be moved back and forth with any movement from a first to a second guide track connection part. During this time, as already initially explained, the vehicle is moved via the guide track connection part of the guide track system onto the movable guide track section, stopped there and moved together with the guide track section in such a manner to the second or another guide track connection part that the vehicle can subsequently continue its travel, wherein the means makes it possible to impose another movement on the guide track section in addition to the movement along the guide structure.

Therefore, it is not only possible, as is shown in DE 101 35 365 A1, to rotate the guide track section together with the vehicle about a stationary axis running approximately horizontally but rather, for example, to combine a rotating movement with a translatory movement. It is also possible to rotate the guide track section in the vehicle about a substantially vertically running axis. A significant aspect here is the fact that the means to be used to this end is designed in such a manner that the further movement is carried out additionally to the movement along the guide structure, that is, independently of the shape of the guide structure. There is a difference here from W0 2005/113657A1 in which the guide track section also makes a rotary as well as a superposed translatory movement; however, here the guide track stipulates the movement of the guide section, which has the result that the translatory movement runs parallel to the axis of rotation. Consequently, an elevated degree of freedom in the superposed movements is made available with the present invention. The guide track section and consequently the vehicle can be moved with a plurality of movements which can also be superposed on each other between two or more guide track connection parts. The attractiveness of the fun fair ride is distinctly increased as a result in comparison to known fun fair rides.

According to present invention the carrier structure can comprise a first section connected to the guide structure and comprises a second section connected to the guide track section, wherein the second section can be moved relative to the first section. In this embodiment of the invention it is possible that the guide track section and the vehicle fixed on it can make other movements relative to the guide structure. For example, the guide track section can be rotated about one or more axes of rotation while it is moved translatorily along the guide structure between the guide track

connection parts. In particular, a back-and-forth movement or a rocking movement can be realized, which further increases the traveling pleasure.

An embodiment is distinguished in that the embodiment comprises another drive device for making available the movement of the first section relative to the second section. In general, it is possible to allow a movement of the guide track section even without a drive device which develops, for example, due to the inertia of the vehicle during the delay on the guide track section or by the shiftings of the weight of the passengers. However, a purposeful movement of the two sections relative to one another can be set with the other dive device, for example, a somersault, which could not be realized solely by the inertia of the vehicle or the shifting weight of the passengers. In addition, the other drive device can be controlled in such a manner that other movements can be set again and again so that the alternation and the surprise effect remain preserved.

In another embodiment the device comprises a limiting unit for limiting the movement of the guide track section. A limiting of the movement is advantageous if the movement should not be too extreme for the passengers. For example, it can be prevented by stops or damping elements that the guide track section in the vehicle execute a somersault. In particular, the using of damping elements can gradually brake a certain movement so that no suddenly stopping movements take place which usually represent a high degree of stress on the human body.

In another embodiment the guide track section can comprise a fixing device for fixing the vehicle on the guide track section. According to which movements are executed by the guide track section when it moves between the first guide track connection part and the second or the other guide track section parts, the vehicle can be put in motion on the guide track section and even be disconnected from the guide track section. Such a disconnection must be prevented under all circumstances, for which reason the vehicle can be held by the fixing device in a certain position on the guide track section independently of which movement the guide track section makes between the two guide track section parts. This distinctly increases the safety of the fun fair ride and in addition even complex movements such as somersaults can be made. The fixing device can comprise catch means and/or wedges which anchor the vehicle on the guide track section and which can be detached from the vehicle again upon reaching the second guide track connection part. Other possibilities are brakes or stops which can limit free movement of the vehicle on the guide track section.

An embodiment according to the invention at least two of the guide track sections can be arranged in a vertically offset manner and the carrier structure can be guided in such a manner by the guide structure that the guide track section can be moved back and forth from the first guide track connection part to the vertically offset second guide track connection part. The expression vertically offset guide track connection parts should denote guide track connection parts which are

arranged at different heights. In this embodiment according to the invention, for example, a free fall can be realized where the vehicle together with the guide track section, starting from the higher, first guide track connection part, is exposed for a certain time to the acceleration of the force of weight without engaging in a delaying or braking manner. Shortly before reaching the second guide track connection part a delay is introduced and the guide track section is aligned in such a manner that it is aligned with the second guide track connection part and the vehicle can continue traveling over the second guide track connection part. It is exactly just as possible to continue the free fall so long that the guide track section passes the second guide track connection part and is located underneath the second guide track connection part and is only then braked. After the guide track section has been braked, the guide track section can be raised with the drive device back to the level of the second guide track connection part so that the vehicle can continue its travel. This can achieve a very attractive enjoyment of the ride. Of course, not only two guide track connection parts can be provided but rather several, so that, for example, a longer and a shorter free fall can be realized.

According to another embodiment, the guide track connection parts are arranged inclined relative to each other. This also allows the enjoyment of the ride to be increased. If, for example, the first guide track connection part, viewed in the direction of travel, is inclined upward, it is more difficult for the passenger to estimate the further course of the travel than is the case with a horizontal course.

Another embodiment is distinguished in that the guide structure is inclined relative to the vertical. In order to be able to realize a freefall in the strict sense, the guide track must follow the acting direction of the force of gravity, that is, it must run vertically or upright. If the guide structure is inclined opposite the vertical, no freefall can be realized but a flight similar to when making a ski jump can be simulated.

In this connection there is an embodiment in which the guide structure is curved or arched and is not designed to be straight. This makes it possible to vary the inclination of the guide structure, for example, in that it is rather heavily inclined opposite the vertical, starting from the first guide track connection part, but then approaches the vertical more and more as is also the case during a jump from a ski jump platform. As a consequence, other movement patterns that further increase the enjoyment of the ride can be realized with the curved or arched guide structure.

In another embodiment the guide track system is constructed as a rail system. The guide track system can also comprise, for example, troughs or pipes, which is especially advantageous if the fun fair ride comprises a lake landscape with waterfalls. In this case the vehicles can be designed as boats and are driven by the water flowing through the troughs and pipes. However, relatively narrow boundaries are set here on the speed of the vehicle and the movements which the vehicle

can make. However, if a rail system is used, the vehicle can be guided in such a manner that it can reach high speeds and make a plurality of movements which also comprise somersaults.

In another embodiment the guide structure can be arranged on a tower or form a tower itself. It is absolutely customary to integrate roller coasters in existing buildings so that the buildings, in as far as they comprises a suitable tower, form a part of the guide structure. Consequently, no separate tower has to be made available, as a result of which the cost of the fun fair ride can be reduced. Alternatively, however, the guide structure can form a tower itself, which is especially appropriate when the fun fair ride is a so-called flying construction which is set up at various fairs for a certain time. The carrier structure can be designed here in such a manner that it can be readily and reliably assembled and disassembled again. This keeps the time low which is needed to assemble and disassemble the fun fair ride.

Another embodiment of the invention relates to a guide track system for vehicles of a fun fair ride, comprising a device according to one of the previously discussed embodiments. The technical effects and advantages which can be achieved with the suggested vehicle correspond to those which were discussed for the suggested drive device. In sum, it is pointed out that it is possible with relatively simple technical means to generate even complex movements of the guide track section and of the vehicle located on the latter so that the attractiveness of the fun fair ride can be increased with a representable expense.

Moreover, an embodiment of the invention relates to a fun fair ride with the guide track system according to the previously presented embodiment. The advantages and technical effects correspond to those which were presented for the guide track system and the device.

In addition, an implementation of the invention relates to a method for operating a fair ride according to the embodiment discussed above, characterized by the following step:

• Executing the movement of the support structure along the guide structure already when the vehicle is still moving on the guide track section.

The advantages and technical effects correspond to those that have been presented for the guide track system and the device.

An exemplary embodiment of the invention is explained in detail in the following with reference made to the attached drawings. In the drawings

Figure 1	shows a first exemplary embodiment of the device according to the invention in a first position, and
Figure 2	shows the exemplary embodiment shown in figure 1 in a second position,
Figure 3	shows the exemplary embodiment shown in figure 1 in a second position, and

Figure 4 shows another exemplary embodiment of the device according to the invention in a first position using a basic representation.

Figure 1 shows an exemplary embodiment of a device 10 according to the invention using a basic representation. The device 10 comprises a guide structure 12 which is designed in the exemplary embodiment shown as a skeletal tower 14 and comprises a guide rail 16. The guide rail 16 is inclined by the angle α relative to the horizontal (and therefore also by the angle of 90° - α relative to the vertical) and is approximately 75° in the example shown. Of course, it is also possible to align the guide rail 16 substantially vertically.

A carrier structure 18 can be moved by a drive device 19 along the guide rail 16. The drive device can comprise not-shown motors, actuators, spring-loaded brakes, traction cables and the like. In addition, the carrier structure 18 is connected to a guide track section 20 of the guide track system 21 on which one or more vehicles 22 can be moved. The guide track system 21 can be designed, for example, like a rail system with which the vehicles 22 are held on the desired guide track. In the example shown, the guide track system 21 comprises a first guide track connection part 24 and a second guide track connection part 26, wherein the first guide track connection part 24 is fastened at the upper end of the guide structure 12 or of the tower 14 and the second guide track connection part 26 is supported in a manner not shown in detail. Jacketed uprights (not shown) can be used to store the second guide track connection part 26. Other guide track connection parts can be provided. The first and the second guide track connection parts 24, 26 are arranged offset from one another in a vertical device by the height difference ΔH (see figure 2). The carrier structure 18 comprises means 27 with which the guide track section 20 can make another movement in addition to the movement along the guide rail 16. In the example shown, the means 27 comprises a first section 28 and a second section 30, wherein the carrier structure 18 is fastened to the first section 28 on the guide structure 12 and to the second section 30 with the guide track section 20. The first section 28 and the second section 30 are supported in a movable manner relative to one another so that they can make, for example, a rotation about a first axis of rotation D1 and/or about a second axis of rotation D2 relative to one another, for which, for example, ball and socket joints which are not shown here can be used. In order to make the movement available, the device 10 comprises another drive device 32. Furthermore, the device 10 comprises a fixing device 34 with which the vehicle 22 can be fixed on the guide track section 20 in the desired position. Furthermore, the device 10 comprises a limiting unit 36 with which the movement of the first section 28 of the carrier structure 18 can be limited relative to the second section 30 of the carrier structure 18, wherein the limiting unit 36 can comprise, for example, one or more stops 38. Furthermore, the second section 30 of the carrier structure 18 can comprise a counterweight 40 arranged on the side

of the axes of rotation D1, D2 opposite the guide track section 20 in order to make the rotation of the first section 28 about the second section 30 more controllable.

The device 10 according to the invention is operated in the following manner: In figure 1 the carrier structure 18 is arranged by the drive device 19 in such a manner regarding the guide structure 12 that the guide track section 20 is aligned with the first guide track connection part 24. Consequently, one or more of the vehicles 22 located on the guide track system 21 can travel from the first guide track connection part 24 onto the guide track section 20. Starting from the first guide track connection part 24, the guide track system 21 is interrupted at the end of the guide track section 20 so that the vehicle 22 leaves the guide track system 21 if it would travel beyond the guide track section 20. In order to prevent this, a limiting stop 42 can be extended against which the vehicle 22 strikes when it has reached the desired position on the guide track section 20. The vehicle 22 can comprise a braking device, which is not shown, in order to be able to be stopped in the desired position.

In order to fix the vehicle 22 in the desired position on the guide track section 20, the fixing device 34 is now actuated, for example, in that a wedge 44, starting from the guide track section 20, is introduced into a receptacle of the vehicle, which receptacle is not shown in detail, with which the vehicle 22 is anchored with the guide track section 20. Subsequently or during the fixing, the carrier structure 18 is moved by a corresponding actuation of the drive device 19 along the guide structure 12 or the guide rail 16, in this case approximately vertically downward. The actuation of the drive device 19 can also include the case that the carrier structure 18 is exposed unbraked to the force of weight in order to be moved along the guide structure 12 (approximately a freefall).

Furthermore, the other drive device 19 is actuated so that the second section 30 of the carrier structure 18 is moved relative to the first section 28 and in particular is rotated. Consequently, the linear movement along the guide structure 12 is superposed by a rotary movement about the first and/or the second axis of rotation D1, D2. The movements along the guide structure 12 and about the first and/or the second axes of rotation D1, D2 are continued until the travel of the vehicle 22 along the guide track system 21 should be continued. To this end, the carrier structure 18 is positioned by the drive device 32 and the other drive device 19 in such a manner that the guide track section 20 is aligned with the second guide track connection part 26 (see figure 2). The guide track section can also be located here temporarily below the second guide track connection part 26, as figure 3 shows. The wedge 44 is moved in by an appropriate actuation of the fixing device 34, which cancels the anchoring of the vehicle 22 on the guide track section 20 and the limiting stop 42 is moved in. The vehicle can now continue traveling along the guide track system 21.

Figure 4 shows another exemplary embodiment of the device 10 according to the invention, which differs from the exemplary embodiment shown in the figures 1 to 3 in that the second guide track

connection part 26 is inclined relative to the first guide track connection part 24. Whereas the first guide track connection part 24 runs horizontally, the second guide track connection part 26 is inclined relative to the horizontal by the angle **β**, which can be, for example, 30°. The angle **β** can be selected as desired and even exceed 90°.

List of reference numerals

10	device
12	guide structure
14	tower
16	guide rail
18	carrier structure
19	drive device
20	guide track section
21	guide track system
22	vehicle
24	first guide track connection part
26	second guide track connection part
27	means
28	first section
30	second section
32	other drive device
34	fixing device
36	limiting unit
38	stops
40	counterweight
44	wedge
ΔH	difference in height
D1	first axis of rotation
D2	second axis of rotation

Patentkrav

1. Apparat til frem- og tilbagegående bevægelse af et ledeskinneafsnit (20) af et ledeskinnesystems (21) til køretøjer (22) på en kørende forlystelse fra et første ledeskinnetilslutningsstykke (24) til et andet ledeskinnetilslutningsstykke (26), der er anbragt i afstand fra det første ledeskinnetilslutningsstykke (24), idet det første og det andet ledeskinnetilslutningsstykke (24, 26) er en del af ledeskinnesystemet (21), omfattende

- et ledeskinneafsnit (20), på hvilket mindst et af køretøjerne (22) kan køres,
- en bærestruktur (18) til at bære ledeskinneafsnittet (20),
- en ledestruktur (12), der omfatter en styreskinne (16), langs hvilken bærestrukturen (18) kan bevæges translatorisk, og ledeskinnetilslutningsstykkerne (24, 26) er anbragt lodret forskudt, og bærestrukturen (18) ved hjælp af ledestrukturen (12) styres således langs ledestrukturen (12), at ledeskinneafsnittet (20) kan bevæges frem og tilbage fra det første ledeskinnetilslutningsstykke (24) til det lodret forskudt anbragte andet ledeskinnetilslutningsstykke (26), og det mindst ene køretøj (22) sammen med ledeskinneafsnittet (20) ud fra det højereliggende første ledeskinnetilslutningsstykke (24) på et bestemt tidspunkt af accelerationen kan udsættes for tyngdekraften uden at blive decelereret eller bremset, og
- en drivindretning (19) til at bevæge bærestrukturen (18) langs ledestrukturen (16),
- idet bærestrukturen (18) omfatter midler (27) til at udføre en svinge- eller en vippebevægelse af ledeskinneafsnittet (20) foruden den translatoriske bevægelse langs ledestrukturen (16), der er overlejret med den translatoriske bevægelse og er uafhængig af den translatoriske bevægelse langs ledestrukturen,
- idet bærestrukturens (18) midler (27) omfatter et med ledestrukturen (16) forbundet første afsnit (28) og et med ledeskinneafsnittet (20) forbundet andet afsnit (30), idet det andet afsnit (30) kan bevæges i forhold til det første afsnit (28).

2. Apparat ifølge krav 1,
kendetegnet ved, at apparatet omfatter en yderligere drivindretning (32) til tilvejebringelse af det første afsnits (28) bevægelse i forhold til det andet afsnit (30).

3. Apparat ifølge et af kravene 1 eller 2,
kendetegnet ved, at apparatet omfatter en begrænsningsenhed (36) til begrænsnig af ledeskinneafsnittets (20) bevægelse.

4. Apparat ifølge et af de foregående krav,
kendetegnet ved, at ledeskinneafsnittet (20) omfatter en fastgørelsesindretning (34) til fastgørelse af køretøjet (22) på ledeskinneafsnittet (20).

5. Apparat ifølge et af de foregående krav,
kendetegnet ved, at ledeskinnetilslutningsstykkerne (24, 26) er anbragt hældende mod hinanden.

6. Apparat ifølge et af de foregående krav,
kendetegnet ved, at ledestrukturen (12) er anbragt hældende i forhold til lodret.

7. Apparat ifølge et af de foregående krav,
kendetegnet ved, at ledestrukturen (12) er krummet.

8. Apparat ifølge et af de foregående krav,
kendetegnet ved, at ledeskinnesystemet (21) er udformet som et sporsystem.

9. Apparat ifølge et af de foregående krav,
kendetegnet ved, at ledestrukturen (12) er anbragt på et tårn (14) eller selv danner et tårn (14).

10. Ledeskinnesystem (21) til køretøjer (22) på en kørende forlystelse, omfattende et apparat (10) ifølge et af de foregående krav.

11. Kørende forlystelse med et ledeskinnesystem (21) ifølge krav 10.

12. Fremgangsmåde til at drive en kørende forlystelse ifølge krav 11, **kendetegnet ved** følgende trin:

- udførelse af bærestrukturens (18) bevægelse langs ledestrukturen (12) allerede, når køretøjet endnu bevæger sig på ledeskinneafsnittet (20).

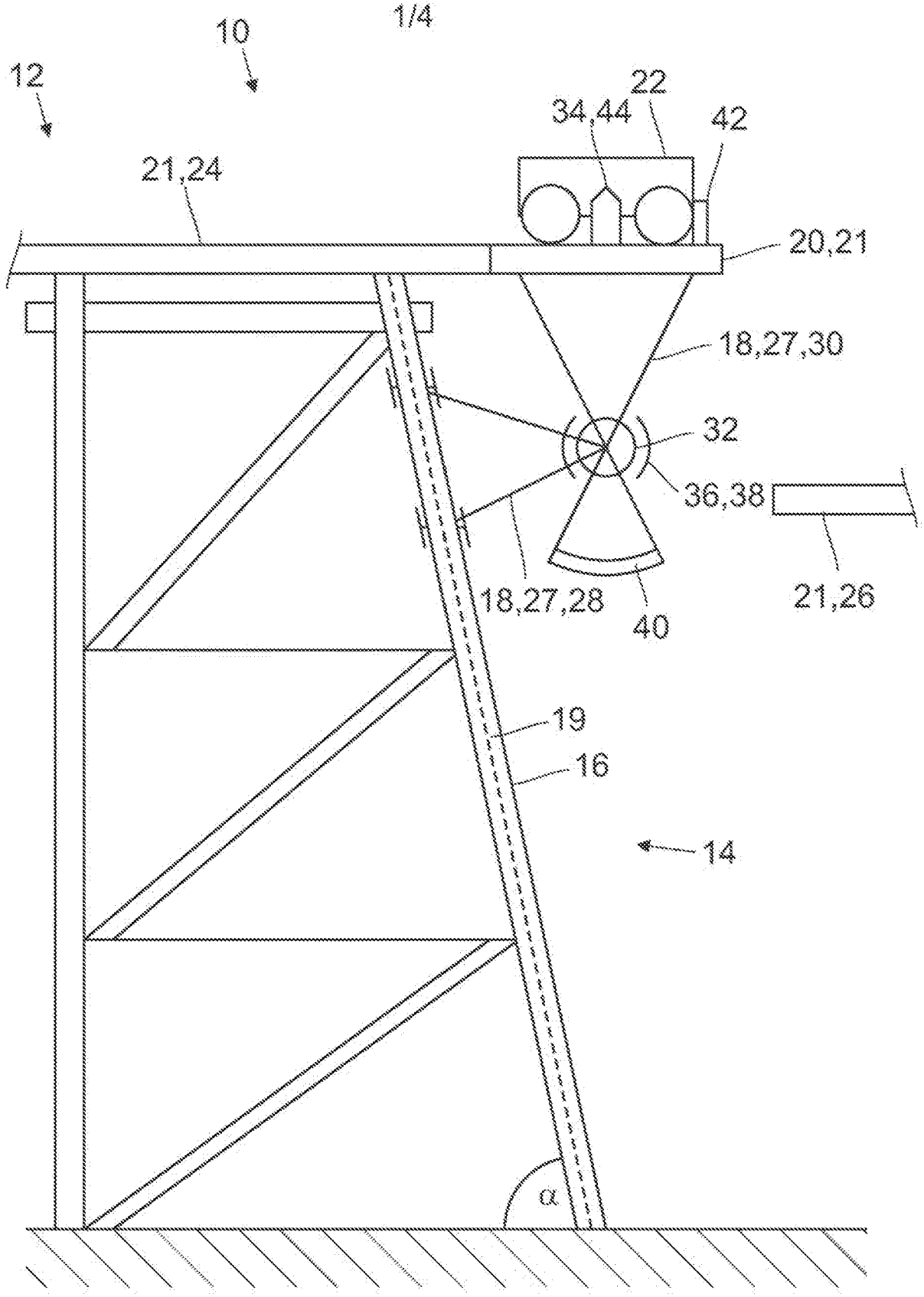

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36,38
18,27,28
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19
16
14
α

Fig.1

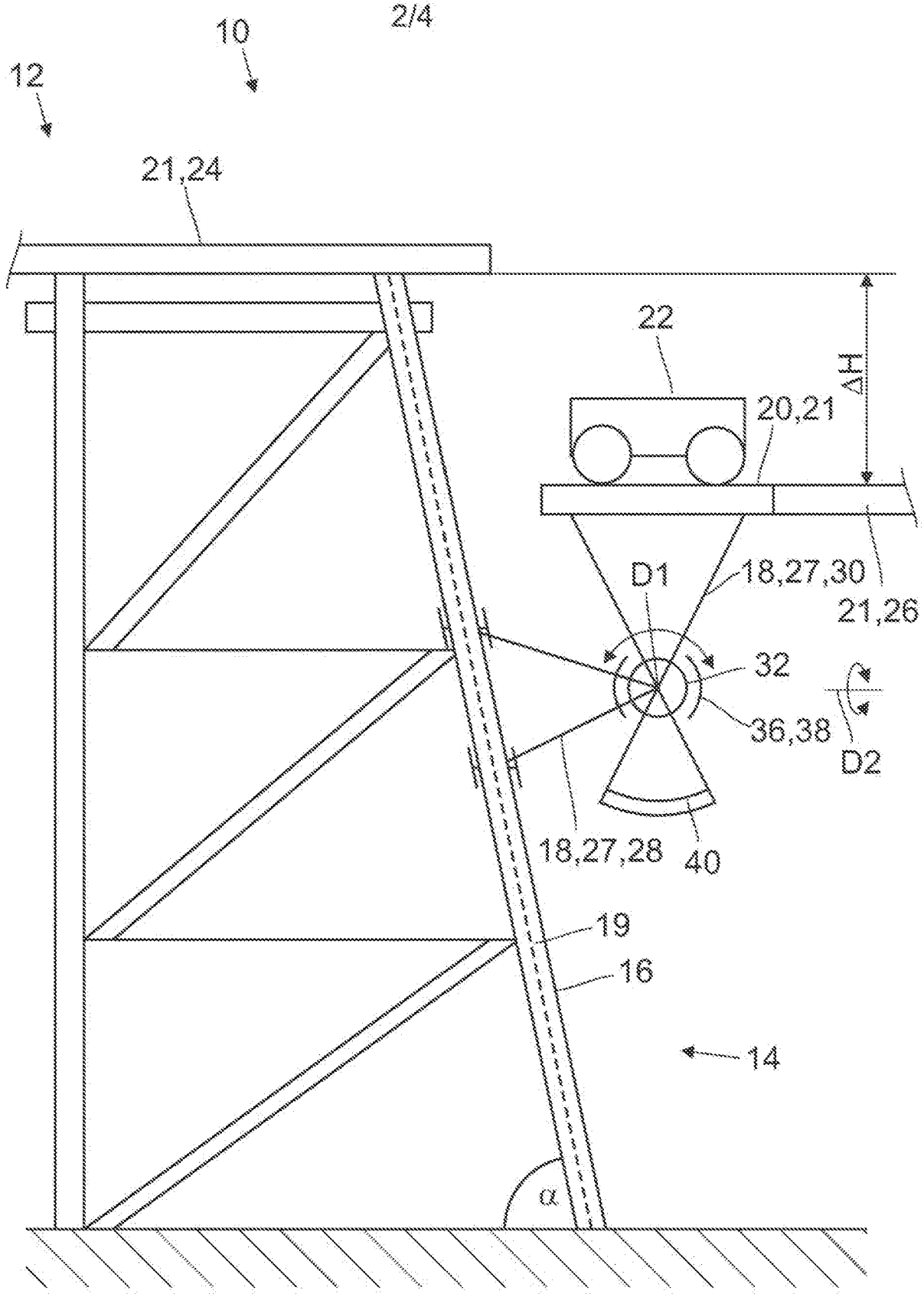

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22
ΔH
20,21
D1
18,27,30
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36,38
D2
18,27,28
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16
14
α

Fig.2

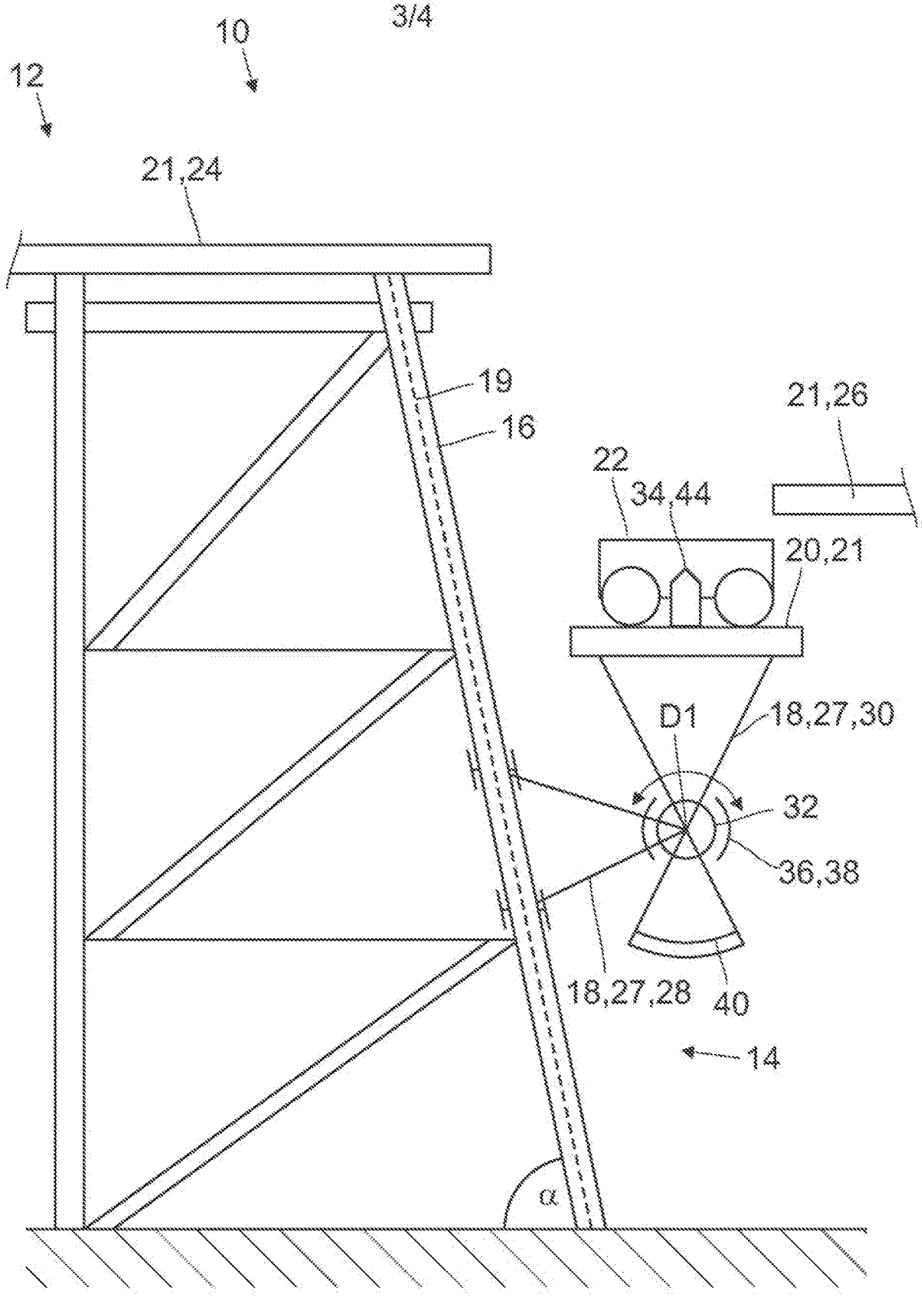

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Fig.3

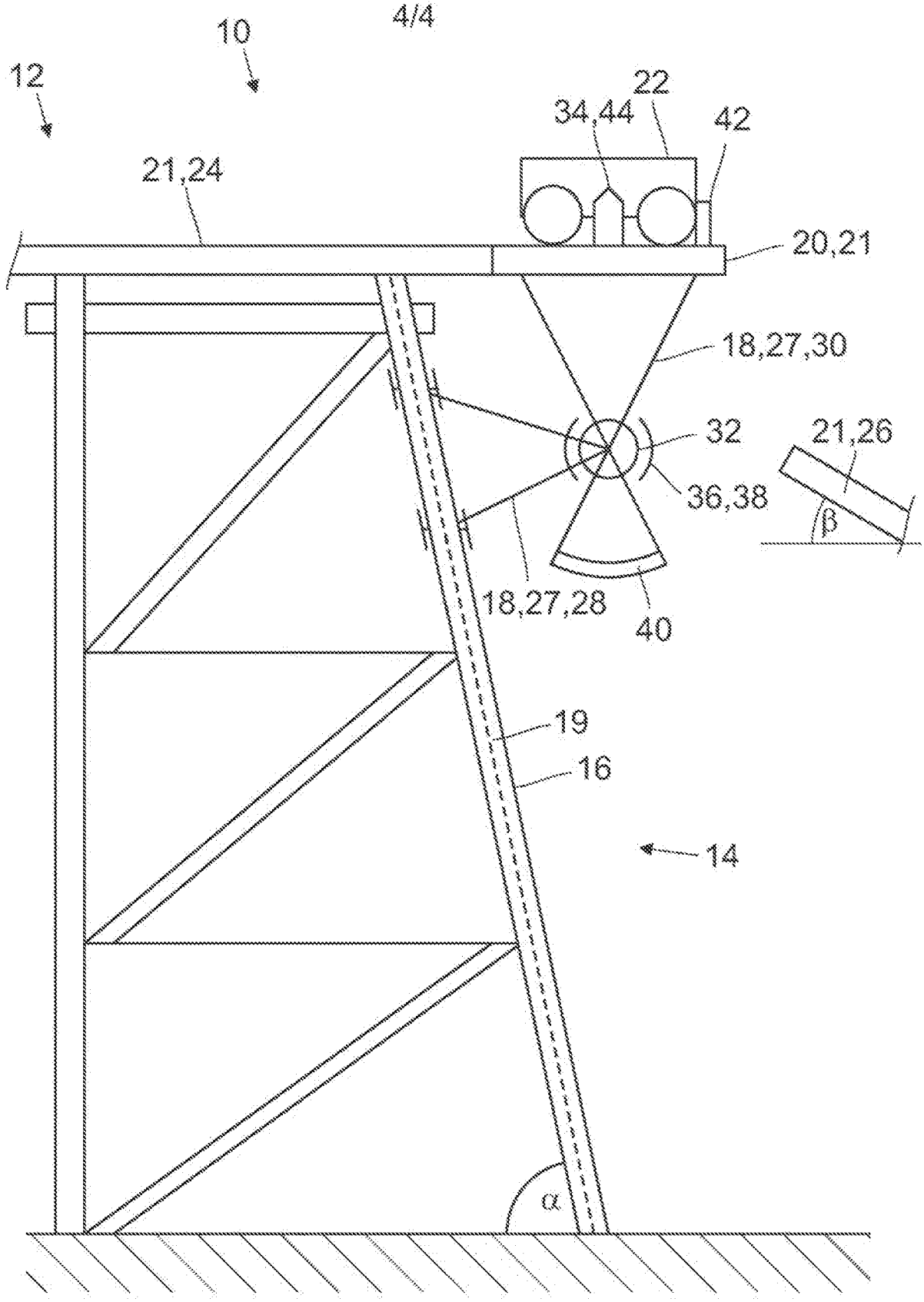

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34,44
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21,24
20,21
18,27,30
32
21,26
36,38
β
18,27,28
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Fig.4