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(54) **A ROLLER BATTERY DEVICE FOR SUPPORTING A HAULING CABLE OF AN AERIAL CABLE TRANSPORTATION SYSTEM AND AN AERIAL CABLE TRANSPORTATION SYSTEM COMPRISING AT LEAST SUCH A ROLLER BATTERY DEVICE**

(57) A roller battery device for supporting a hauling cable of an aerial cable transportation system; the roller battery device being configured for identifying a longitudinal axis L of support for the hauling cable and comprising:

an entry rocker arm; a first entry roller coupled to the entry rocker arm in a rotating manner about a rotation axis orthogonal to the longitudinal axis L; wherein the first entry roller is slidable along the rotation axis.

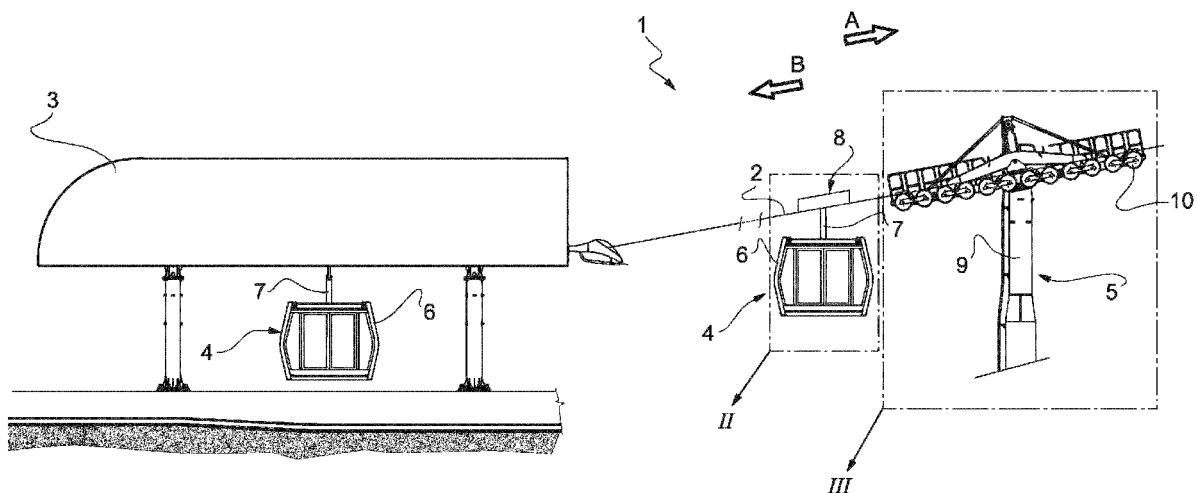


FIG. 1

Description

Cross-reference to related applications

[0001] This Patent Application claims priority from Italian Patent Application No. 102021000018992 filed on July 19, 2021.

Technical field

[0002] The technical field of the present invention refers to aerial cable transportation systems, i.e. to the systems in which the passengers are transported along a predefined path by means of transportation units moved and supported in succession one after the other in aerial mode. According to the present invention, in these systems the advancement of the units is generated by a hauling cable whereas the aerial support is ensured by at least a supporting cable. In the case of monocable systems, the sole cable present simultaneously has the double function of aerial support and hauling. The path is limited at the ends by terminal stations in which the passengers can carry out the embarkation and the debarkation from the transportation units. Among the terminal stations, such systems usually comprise intermediate structures that can be embarkation and debarkation intermediate stations or intermediate structures for supporting the cable generally having the shape of pylons or towers.

[0003] In such technical context, the present invention will deal with the problem of how to improve the support of the hauling cable at these intermediate structures. Specifically, the present invention will deal with the problem of how to improve the support of the hauling cable at these intermediate structures in case of transversal wind which causes the cable to stray from its theoretical position.

State of the art

[0004] Nowadays aerial cable transportation systems are greatly widespread, and thus well known to a person skilled in this art, in which the passengers are transported along a predefined route by means of suitable transportation units fed one after the other between two embarkation and debarkation terminal stations, also known as upstream and downstream stations, located at the ends of the system. In particular, according to the present invention, the term "aerial" refers to cabled systems in which the transportation units are moved by a hauling cable and supported in a lifted position with respect to the underlying ground (hence aerial) by at least a supporting cable. The present invention refers both to the aerial cable transportation systems of the "monocable" type, wherein the sole cable present has the double function of hauling and aerial support, and to the transportation systems of the double cable bearing hauling type, as well as to the "bi-cable" and "three-cable" systems in

which besides the hauling cable there are respectively one or two distinct supporting cables. As is known, the hauling cable is ring-returned between the terminal stations at suitable pulleys (of which one motorised) and runs along the entire system. In the case at least a supporting (exclusively supporting) cable is present, the latter is substantially fixed (i.e. not moved between the stations but for periodical maintenance steps and subject only to limited movements due to the variation of the loading conditions of the line) and the transportation units comprise further devices (for example trolleys with rollers) capable of sliding along the supporting cable. In the following, for convenience, reference will be made to a single cable understood as both hauling and supporting unless specifically indicated differently. In any case, as indicated in the foregoing, the present invention is not limited to the sole monocable systems.

[0005] An aerial cable transportation system is very useful when the shape of the underlying ground, or other side factors, do not make the classic land advancement practicable. For example, such aerial cable systems are used in the case where the route to be travelled provides for important altimetric jumps, also with considerable slopes. Such route is typical of ski/mountain localities and in such context these systems are also called lift systems. However, the present invention and the aerial cable systems in general are advantageously also applied to urban contexts where the land transportation is congested. As is known, it is often necessary to also provide for intermediate fixed structures along the route between the terminal stations configured to support the cable. A reason for requiring such intermediate fixed structures can be the excessive distance between the terminal stations such not to allow disposing the cable in a single span. Another reason can be the altimetric profile of the path in the case where there are important changes of slope. Every intermediate fixed structure for supporting the cable usually comprises a vertical supporting structure, such as for example a pylon or a tower, on the top of which devices are provided for supporting and guiding the cable, for example a head with a series of rollers known as roller battery. These rollers can be disposed along a single row (known as resting or holding roller) or along two superimposed rows between which the cable slides (double-effect roller). If at least a supporting cable (bi-cable or three-cable system) is present, the latter is always supported at the head of the pylons in a suitable structure known as shoe. At such shoe, the rollers that usually roll on the supporting cable roll on the external profiles of the shoe.

[0006] Therefore, as described above and as is known, roller battery for supporting the hauling cable comprises a plurality of rollers disposed in series with respect to each other defining a longitudinal direction. Each roller is rotatable about a corresponding pin orthogonal to the longitudinal direction. Following the advancement direction of the cable, the first roller of a roller (or downstream roller) is called in the present invention "entry roller"

whereas the opposite upstream roller last roller is called "exit roller". In absence of external transverse forces, the axis of the hauling cable (and the advancement direction thereof) corresponds to the aforementioned longitudinal direction defined by the roller battery (direction defined by the series of rollers). However, in case of transversal wind acting on the transportation units in movement along the system, the hauling cable is at the entry of the entry roller in a position not exactly corresponding to the theoretical one that there would be in absence of wind. In fact, with the presence of transversal wind, the hauling cable is at the entry of the entry roller with a non-null entry angle and therefore not aligned with the theoretical advancement direction and with the longitudinal development of the rollers of the roller battery. Such entry angle thus causes the cable, at least at the entry portion of the entry roller, to be not exactly in the centre of the roller, where a suitable housing groove is usually provided, but in a lateral position which is gradually straightened during the advancement along the roller. In case of strong wind, thus in the presence of wide entry angles, the cable can also enter into contact with the lateral walls of the roller or, in extreme cases, "fleet" i.e. find itself in a lateral position outside of the roller. The latter condition is obviously extremely hazardous but also the previous conditions are not optimal because the transversal strains generated by the cable on the roller battery are entirely transmitted to the structure creating a mechanical stress.

Description of the invention

[0007] Starting from such prior art, an object of the present invention is to manufacture a new and inventive roller battery device for supporting the hauling cable of an aerial cable transportation system capable of overcoming the aforementioned drawbacks of the prior art. In particular, the object of the present invention is to manufacture a new and inventive roller battery device for supporting the hauling cable of an aerial cable transportation system which in case of transversal wind is capable of going along with the deviation of the cable from the nominal position so as to absorb the generated transversal strains and prevent fleets.

[0008] In accordance with such objectives, the present invention is a new and inventive technical solution which provides for a roller battery device (i.e. a series of rollers along a longitudinal direction) configured to support the hauling cable along a longitudinal axis L (which usually coincides with the axis of the cable) and comprising the following elements:

- an entry rocker arm;
- a first entry roller coupled to the entry rocker arm in a rotating manner about a rotation axis orthogonal to the longitudinal direction L.

[0009] Such elements are known to the person skilled in the art and thus do not require further details. Usually,

it is indicated that the definition "entry" means that they are the first elements of the device along the advancement direction of the cable. The first entry roller is thus the first roller that cooperates with the cable i.e., keeping into account the advancement direction of the cable, the roller the most upstream the roller. Although well known to the person skilled in the art, in order to better define the directions and the axes that will be mentioned, the longitudinal direction is defined by a series of rollers and theoretically coincides with the axis of the cable in absence of wind, the transversal direction is orthogonal to the longitudinal direction and to the gravity direction.

[0010] According to the main aspect of the present invention, among all the rollers present at least the first entry roller is slidable along its own rotation axis. In such manner, the first entry roller can assume a plurality of positions along its own rotation axis in order to better support the cable when it has a non-null entry angle with respect to the theoretical longitudinal direction L. It will be the actual cable to bring the entry roller in a transverse position such to prevent the transmission of excessive strains to the structure. On the contrary, on the standard rollers the roller has no possibility of moving transversally thus transmitting overloads to the structure.

[0011] Preferably, the movement of the first entry roller along its own rotation axis can be sprung (the figures will show an example of such solution in which at least a pair of springs are arranged at the opposite ends of the pin supporting the roller between the roller and the entry rocker arm) so as to define an ensured neutral position in absence (or below a threshold value) of external transverse forces and simultaneously a plurality of transverse positions depending on the external transverse force present (i.e. forces that exceed the force of the springs).

[0012] Preferably, the roller battery device comprises at least a sensor configured to monitor the position of the first entry roller along its own rotation axis. In this manner, the presence of transversal wind and the entity thereof is indirectly indicated. An end stroke sensor can also be provided so as to signal that the first entry roller transversely abuts against the rocker arm. Therefore, a pair of sensors could be present facing the roller in which a first sensor progressively detects the transverse position of the roller while a second sensor detects an end transverse position beyond which a hazardous situation could generate. In fact, in this condition, some transversal strains can be transmitted to the structure with possible mechanical interferences between the transportation units and the roller. In such case, an automatic control can be provided for signalling a hazardous state and a control unit can be provided connected to the sensors for the automatic and autonomous implementation of corresponding safety operations. Of course, also a single sensor can be provided that carries out both the above-indicated functions.

[0013] Preferably, the sensor (or the sensors) that measures the position of the first entry roller along its own rotation axis is positioned at the external side to-

wards the line of the roller. In this manner, it is possible to control how much the cable is deviated at the end of the roller so as to control and thus prevent conditions of excessive deviation that can lead to the fleet of the cable.

[0014] Of course, the roller battery device can comprise a plurality of rocker arms in series and supported in turn in a rotating manner by at least a supporting frame by means of corresponding transversal pins. Furthermore, the roller battery device can comprise a plurality of supporting frames supported in a rotating manner by a main frame by means of corresponding transversal pins.

[0015] Finally, it is possible to extend the innovative concept of the present invention also to other rollers of the roller battery besides the first entry roller.

[0016] Preferably, also the second entry roller downstream for first can be slidable (preferably in a sprung manner) along its own rotation axis.

[0017] Preferably, also the last exit roller (i.e. the most downstream roller) and/or the second exit roller upstream the last can be slidable (preferably in a sprung manner) along its own rotation axis.

[0018] Preferably, also other rollers among the end rollers of the roller battery can be slidable (preferably in a sprung manner) along their own rotation axis.

[0019] The present invention also refers to corresponding aerial cable transportation systems that comprise the following (minimum) elements:

- two opposite terminal stations;
- at least a hauling cable moved between the terminal stations;
- at least a transportation unit moved along the system by the hauling cable;
- at least an intermediate structure between the terminal stations supporting the hauling cable;

wherein the intermediate structure comprises at least a roller battery device as claimed in any one of the appended claims and as described in the foregoing.

[0020] Incidentally, the intermediate structure usually has the shape of a pylon. However, the intermediate structure can also be an intermediate station.

[0021] Obviously, other elements are usually present in an aerial cable transportation system but were not expressly listed herein because they are well known to the person skilled in the art. As already mentioned, the invention can be applied both to monocable systems in which a single cable has the function of aerial support hauling and to systems with more than one cable in which a hauling cable and at least a supporting cable are present.

[0022] Types of sensors configured to detect the position of the entry roller along the pin thereof are known, for example they can be optic sensors or proximity magnetic sensors. Even if not explicitly mentioned, the system comprises at least a control unit connected to the sensors. Such control unit can be the same already usu-

ally in use in the system in which the new functionalities are inserted or can be a (or more) control unit suitably dedicated to the implementation of the invention. How such control unit is connected to the sensors and how it can receive therefrom the information of the position of the entry roller along the pin thereof is well known to the person skilled in the art.

List of the Figures

[0023] Further characteristics and advantages of the present invention will be apparent from the following description of a non-limiting example embodiment thereof, with reference to the figures of the accompanying drawings, wherein:

- Figure 1 is a schematic view of a portion of aerial cable transportation system;
- Figure 2 is a schematic view of the component indicated in Figure 1 by reference numeral II, i.e. a transportation unit having the shape of a cabin;
- Figure 3 is a schematic view of the component indicated in Figure 1 by reference numeral III, i.e. a fixed intermediate supporting structure of the cable having the shape of a vertical pylon;
- Figures 4 and 5 are respectively a side view and a top view of an example of a roller battery device in which the present invention is integrated;
- Figures 6 and 7 are sectional views obtained respectively along the section lines VI-VI and VII-VII indicated in Figure 4.

Description of an embodiment of the invention

[0024] Therefore, referring to the accompanying figures, an embodiment of the present invention is shown. Figure 1 schematically shows a portion of an aerial cable transportation system indicated, as a whole, by reference numeral 1. In such non-limiting example, the aerial cable system 1 is of the monocable type and thus comprises one single cable 2 which has the double function of hauling and of aerial support. Such cable 2 is ring-returned by means of two pulleys, of which one is motorised, between two terminal stations, in particular a first terminal station or downstream station 3 and a second upstream terminal station (not shown). Therefore, two parallel branches are present which identify an ascent branch and a descent branch. The arrows A and B in Figure 1 indicate the advancement directions of the ascent and descent branches of the cable 2. Figure 1 shows one of the many transportation units 4 present in the system which are disposed one after the other along both the ascent and the descent branches. In the representation of Figure 1 a first transportation unit 4 is at the downstream station 3 inside which the transportation units 4 are usually free from the cable 2 so as to advance more slowly. Such slowing down is advantageous for allowing an easy embarkation and debarkation of the passengers

without reducing the traveling speed of the line between one station and the other. The second transportation unit 4 shown in Figure 1 is traveling the ascent branch of the cable 2 and is disposed between the downstream station 3 and a first fixed intermediate supporting structure 5 (pylon-shaped) disposed along the route. The function of the pylons 5 disposed between the terminal stations and possibly between the intermediate stations is to divide the cable 2 in spans. Although both the transportation unit 4 and the pylon 5 will be object of the description of Figures 2 and 3, already in Figure 1 it is possible to see how the transportation unit 4 of the shown example comprises at the bottom a cabin 6 and at the top a supporting arm 7 (called suspension) which connects it to the cable 2. As is visible in Figure 2, the cabins 6 (at least in the section outside of the station) are suspended in the void not resting at the bottom on any lower structure and therefore, due to the fact of being constrained at the top to the cable 2 they can be subjected to rolling movements about the axis of the cable 2, for example by effect of the lateral wind as well as to longitudinal pitch movements. Reference numeral 8 in Figure 1 schematically shows the device that connects the supporting arm 7 to the cable 2. Such device can comprise a releasable clamp. Finally, in Figure 1 it is possible to notice how the pylon 5 comprises a vertical portion 9 at the top of which there is a row of rollers known as roller battery device 10 for supporting the cable 2.

[0025] As already mentioned in the foregoing, Figure 2 shows a schematic view of the component indicated in Figure 1 by reference numeral II, i.e. a transportation unit 4 comprising a relative cabin 6. In particular, Figure 2 shows a front view of the unit 4 along the axis of the cable 2. As is visible, unit 4 comprises a cabin 6 provided with a floor or bottom 11, a roof 12 and lateral walls 13. At a side of the lateral walls 13 there is a movable door (not shown), a foot board 14 for aiding the entry and the exit of the passengers and pockets 15 in which objects can be placed such as skis 16 rackets or other. The unit 4 further comprises a supporting arm 7 (called suspension) having a first lower end 17 coupled to the roof 12 of the cabin 6, by means of an intermediate frame, and an upper end 18 provided with a coupling clamp 19 releasable with the cable 2. The clamping mechanism is of known type and comprises a spring 20 and an actuation lever 21 which in station, by means of suitably shaped guides, is moved in order to overcome the force of the spring 20 and free the cable 2 from the clamp 19. As is visible, the bottom 11 of the cabin 6, not lying on any guiding or supporting structure, is suspended in the void and therefore, by effect of the constraint on the cable 2 placed on top of the roof 12, the cabin 6 can carry out oscillations (for example rolling oscillations schematised by R in Figure 2 about the axis defined by the cable 2). In particular, such rolling R can be generated by the presence of a lateral force (schematised by F in Figure 2) for example due to the presence of wind. Therefore, it is possible that in some circumstances the cabin 6 is in a tilted position

laterally dragging the cable 2 in a different position from the theoretical one. The transportation unit shown in the figures and having the shape of a cabin is only a non-limiting example.

[0026] As already mentioned in the foregoing, Figure 3 shows a schematic view of the component indicated in Figure 1 by reference numeral III, i.e. a fixed intermediate supporting structure 5 for the cable 2. In particular, Figure 3 substantially shows the upper half of a pylon 5 and allows seeing how the roller 10, mentioned in the foregoing, is supported by such structure 5. The upper end of the pylon 5 comprises two shelf supporting structures 22 which, cantilevered, extend symmetrically with respect to the pylon 5. Each external end of such shelves 22 supports a double row of rollers superimposed with respect to each other making a passage for the ascent and descent branches of the cable 2. Such shelves 22 further comprise a footpath 23 and a platform 24 for enabling the inspection of the rollers. It is possible to access such footpath 23 and platform 24, for example, by means of a ladder 25 which runs along the pylon 5.

[0027] Figures 4 and 5 are respectively a side view and a top view of an example of a roller battery device 10 in which the present invention is integrated, in particular is non-limitedly integrated at the first entry roller. These figures further indicate with suitable reference numerals the longitudinal axis L defined by a series of rollers, the advancement direction A of the cable 2, the vertical direction G defined by the force of gravity and the transversal direction T. In absence of lateral forces, the longitudinal axis L defined by a series of rollers coincides with the axis of the cable 2. However, in case of lateral wind along the transversal direction T the axis of the cable 2 does not coincide with the longitudinal axis L (at least in the section and at the entry of the roller). Reference numeral 26 indicates all the rollers of the roller battery (only the last roller is indicated by 26a) because in general the present invention can be applied to any rollers present. In this example, it will be applied only to the first entry roller of the device 10, i.e. the first roller disposed along the advancement direction A of the cable. According to this example, the roller battery 10 comprises four rocker arms 28 each of which supports a pair of rollers 26. The rocker arm 28 that supports the first entry roller 26 is called in the claims entry rocker arm. However, all the rocker arms 28 are the same with respect to each other. The reference numerals 29 indicate two supporting frames each of which supports a pair of rocker arms 28. Finally, reference numeral 30 identifies a main frame that supports the two supporting frames 29. The rollers 26 are supported (preferably by means of transversal pins) in a rotating manner with respect to the rocker arms 28 about corresponding transverse rotation axes 27 parallel to the transversal direction T. The rocker arms 28 are supported in a rotating manner with respect to the supporting frames 29 by means of transversal pins 31 and the supporting frames 29 are supported in a rotating manner with respect to the main frame by means of transver-

sal pins 32.

[0028] Figures 6 and 7 are sectional views obtained respectively along the section lines VI-VI and VII-VII indicated in Figure 4 and allow seeing how in this example the first entry roller 26 has been improved according to the present invention. In particular in these figures, it is possible to see a transversal pin 36 that supports the entry roller 26 and defines the rotation axis 17 so that the roller is supported in a rotating manner with respect to the entry rocker arm 28. As is known, between the roller 26 and such transversal pin 36 two bearings 34 are provided. According to this example, the rocker arm is made in the shape of two facing vertical plates 35 connected by one or more bolts about one of which the transversal pin 36 is positioned which cooperates with a bushing or cylindrical sleeve 33 between the plates 35. Reference numeral 37 indicates two springs arranged about the transversal pin 36 between the plates 35 and the bearings 34. As mentioned in the general description of the invention, these springs are an example of the sprung support of the sliding of the roller 26 on its own rotation axis 27 for identifying a stable position of the roller 26 in absence of transversal forces and a plurality of transverse positions depending on the transversal force present. Finally, in Figure 7 it is possible to see the presence of two sensors 38 configured to monitor the position of the roller 26 along the rotation axis 27 and thus indirectly allow knowing the possible transversal force present. In such example, in particular a sensor is configured to progressively detect the transverse position of the roller, whereas the other sensor is of "end stroke" type, i.e. is configured to detect the reaching of a transverse end position or threshold beyond which a hazardous situation could generate. As is mentioned in the general description of the invention, the position of these sensors 38 at the external side towards the line of the roller 26 is not casual because the control of the deviation of the cable 2 in such point is fundamental for preventing phenomena of fleet. The remaining visible components in Figures 6 and 7 possibly not mentioned or described are known to the person skilled in the art.

[0029] Finally, as mentioned in the foregoing, although not shown, also the remaining rollers 26 or only some thereof can be like the first entry roller i.e. slidable, preferably in a sprung manner, along their own rotation axis.

[0030] It is evident that modifications and variations can be made to the invention described herein without thereby departing from the scope of the appended claims.

Claims

1. A roller battery device (10) for supporting a hauling cable (2) of an aerial cable transportation system (1); the roller battery device (10) being configured for identifying a longitudinal axis (L) of support for the hauling cable (2) and comprising:

- an entry rocker arm (28);
- a first entry roller (26) coupled to the entry rocker arm (28) in a rotating manner about a rotation axis (27) orthogonal to the longitudinal axis (L);

characterised in that

- the first entry roller (26) is slidable along the rotation axis (27).

2. Roller battery device as claimed in claim 1, wherein the first entry roller (26) is slidable in a sprung manner along the rotation axis (27) to define a neutral position in absence of external transverse force (T) orthogonal to the longitudinal axis (L) and a plurality of transverse positions depending on the external transverse force (T) present.
3. Roller battery device as claimed in claim 2, wherein a pin (36) is provided for supporting the first entry roller (26), at least a spring (37) being arranged around the pin (33) between the first entry roller (26) and the entry rocker arm (28), preferably two springs (37) at the opposite ends of the pin (36).
4. Roller battery device as claimed in any one of the foregoing claims, wherein at least a sensor (38) is provided configured for progressively monitoring the position of the first entry roller (26) along the rotation axis (27) and/or at least a sensor configured to detect the reaching of transverse threshold positions.
5. Roller battery device as claimed in any one of the foregoing claims, wherein a second entry roller (26) is provided directly downstream the first entry roller (26) and coupled to the entry rocker arm (28) in a rotating manner about a rotation axis (27) orthogonal to the longitudinal axis (L), also the second entry roller (26) being slidable along the rotation axis (27), preferably the second entry roller (26) being slidable in a sprung manner along the rotation axis (27) to define a neutral position in absence of external transverse force (T) orthogonal to the longitudinal axis (L) and a plurality of transverse positions depending on the external transverse force (T) present.
6. Roller battery device as claimed in claim 5, wherein sensors (38) are provided configured for progressively monitoring the position of the first and second entry roller (26) along the corresponding rotation axes (27) and/or sensors configured to detect the reaching of a transverse threshold position of the first and second entry roller (26).
7. Roller battery device as claimed in claim 4 or 6, wherein the sensor/s (38) is/are arranged at the outer side of the line of the entry roller/s (26).

8. Roller battery device as claimed in any one of the foregoing claims, wherein the roller battery device comprises an exit rocker arm (28) and a last exit roller (26a) coupled to the exit rocker arm (28) in a rotating manner about a rotation axis (27) orthogonal to the longitudinal axis (L); also the last exit roller (26a) is slidable along the rotation axis (27); preferably the last exit roller (26a) is slidable in a sprung manner along the rotation axis (27) to define a neutral position in absence of external transverse force (T) orthogonal to the longitudinal axis (L) and a plurality of transverse positions depending on the external transverse force (T) present.
9. Roller battery device as claimed in claim 8, wherein a second exit roller (26) is provided directly upstream the last exit roller (26a) and coupled to the exit rocker arm (28) in a rotating manner about a rotation axis (27) orthogonal to the longitudinal axis (L), also the second exit roller (26) being slidable along the rotation axis (27), preferably the second exit roller (26) being slidable in a sprung manner along the rotation axis (27) to define a neutral position in absence of external transverse force (T) orthogonal to the longitudinal axis (L) and a plurality of transverse positions depending on the external transverse force (T) present.
10. Roller battery device as claimed in claim 8 or 9, wherein sensors (38) are provided configured for progressively monitoring the position of the last (26a) and second exit roller (26) along the corresponding rotation axes (27) and/or sensors configured to detect the reaching of a transverse threshold position of the last (26a) and second exit roller (26).
11. Roller battery device as claimed in claim 4 or 6 or 10, wherein a control unit is provided connected to the sensor/s (38) and configured for autonomously activating safety procedures if the transverse position along the rotation axis (27) of the monitored roller/s exceeds a critical threshold value.
12. Roller battery device as claimed in any one of the foregoing claims, wherein the roller battery device comprises a plurality of rocker arms (28) supported in rotating manner by at least a supporting frame (29) by means of corresponding transversal pins (31).
13. Roller battery device as claimed in claim 12, wherein the roller battery device comprises a plurality of supporting frames (29) supported in rotating manner by a main frame (30) by means of corresponding transversal pins (32).
14. An aerial cable transportation system (1) comprising:
- at least a hauling cable (2) moved between the terminal stations (3);
 - at least a transporting unit (4) moved along the system by the hauling cable (2);
 - at least an intermediate structure (5) between the terminal stations (3) for supporting the hauling cable (2);
- wherein the intermediate structure (5) comprises a roller battery device (10) as claimed in any one of the foregoing claims.
15. System as claimed in claim 14, wherein the intermediate structure (5) is a pylon.
16. System as claimed in claim 14 or 15, wherein the intermediate structure (5) is an intermediate station.

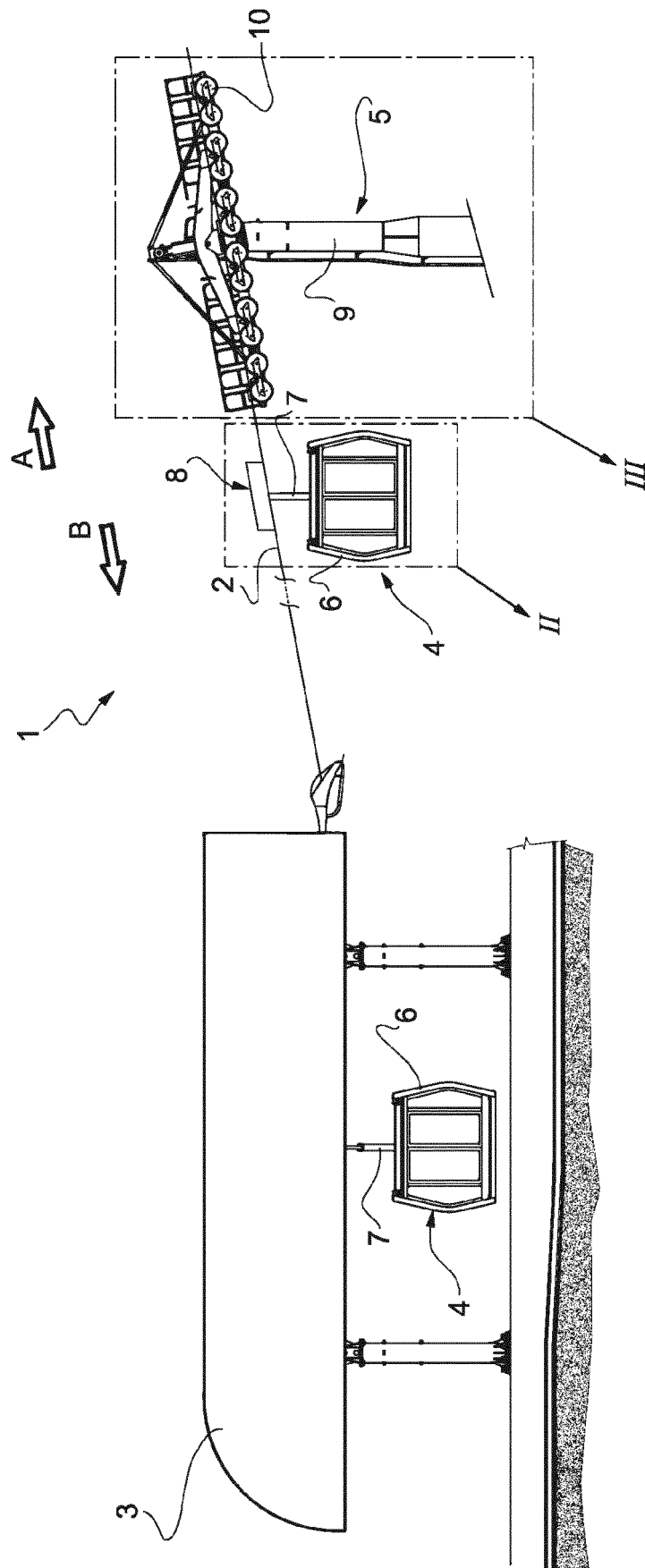


FIG. 1

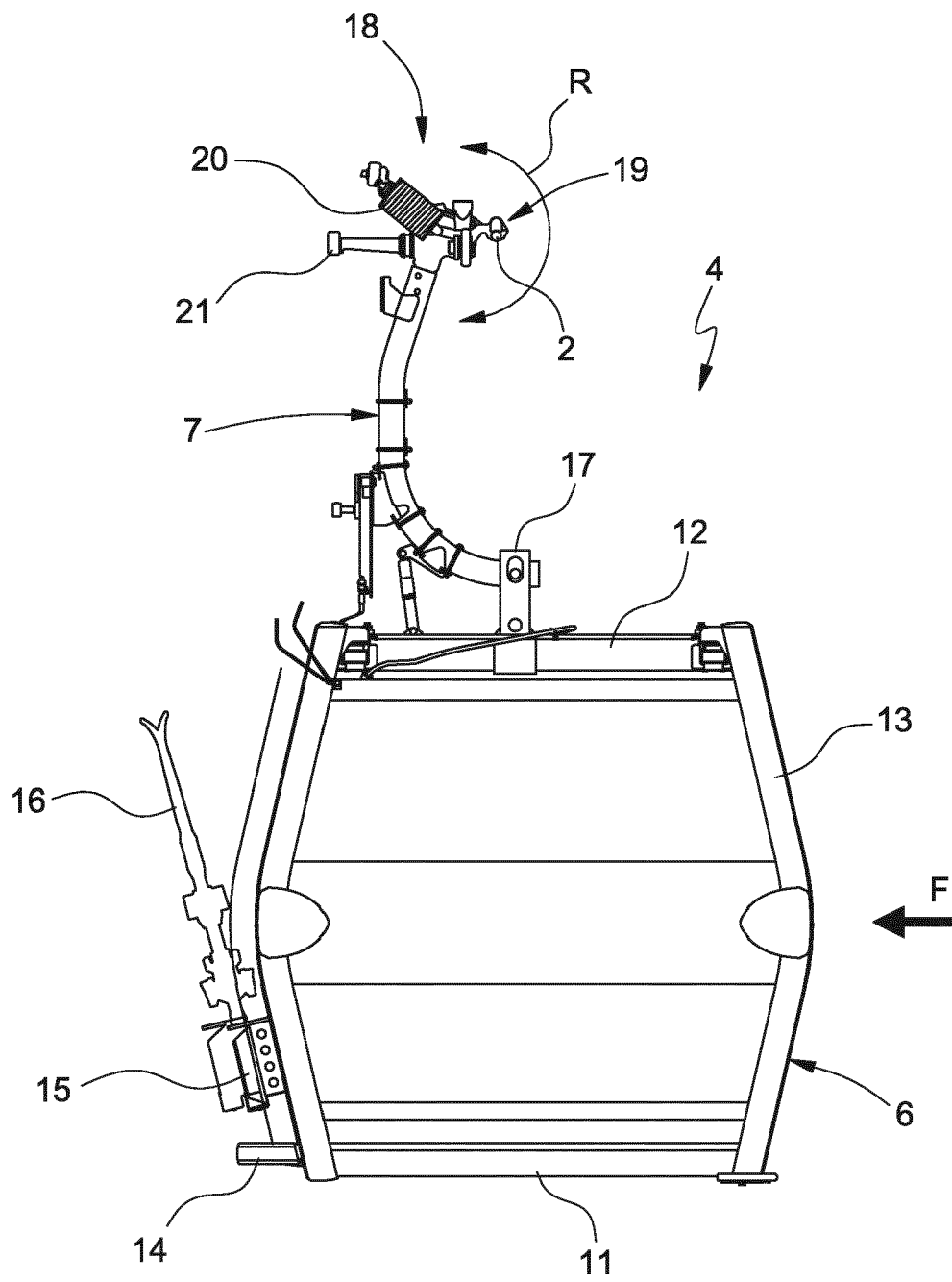


FIG. 2

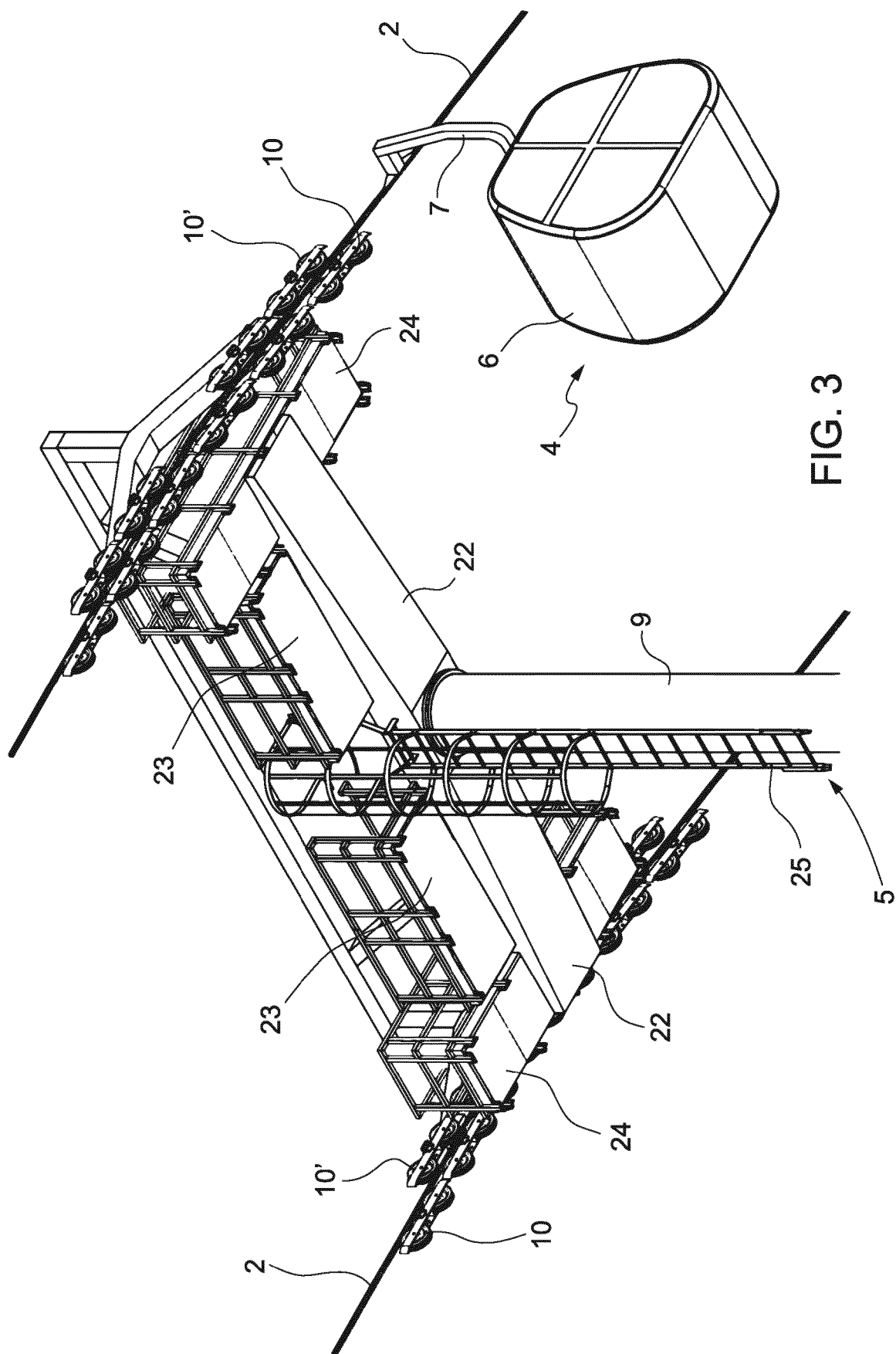


FIG. 3

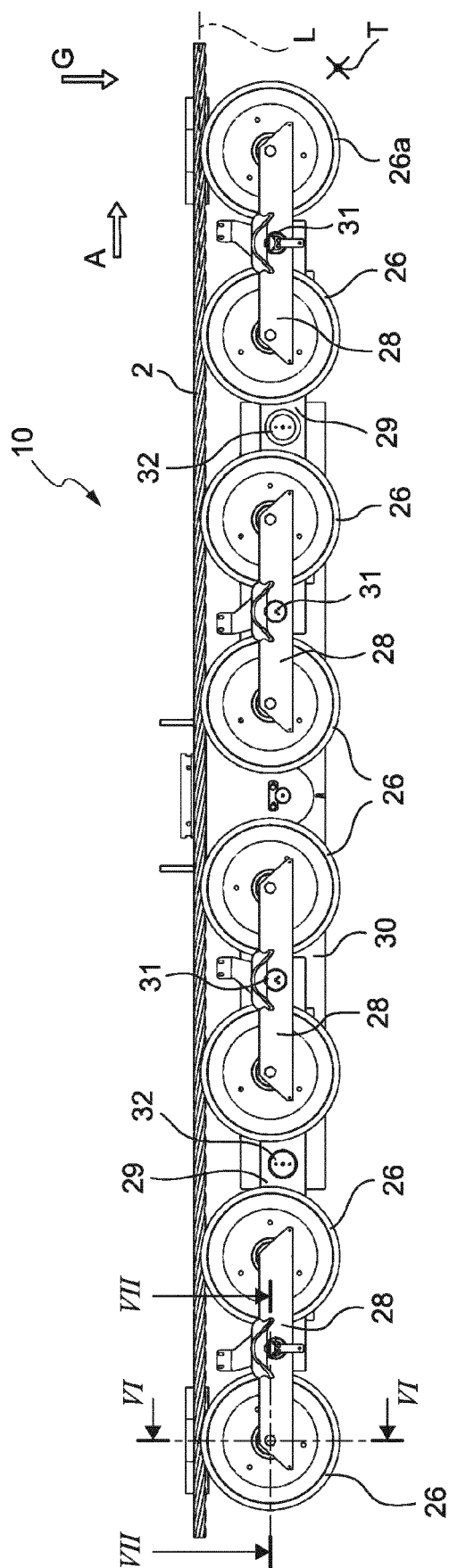


FIG. 4

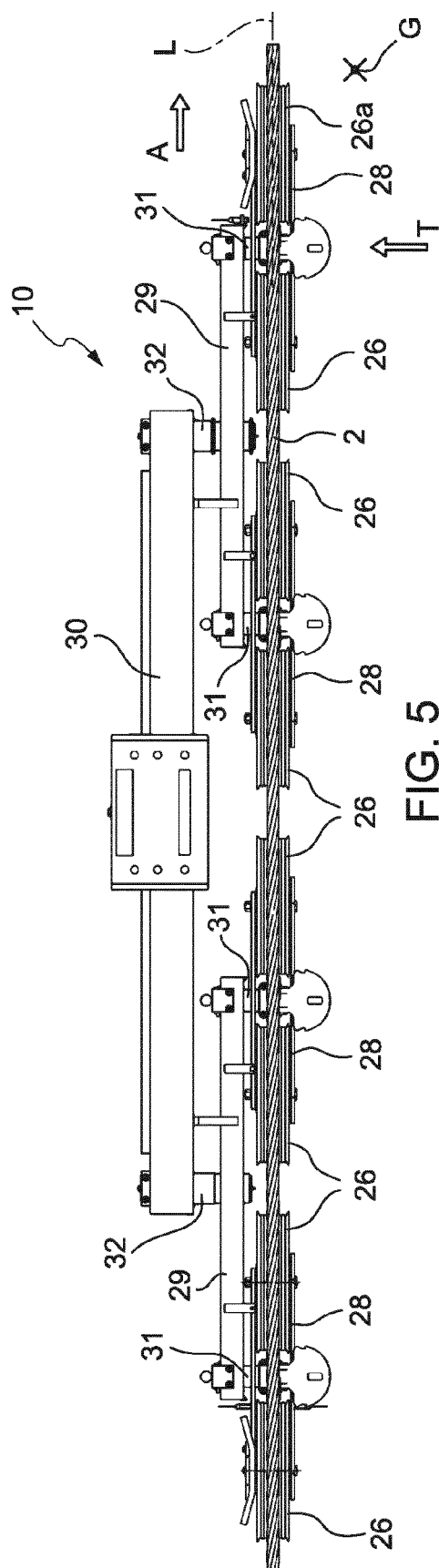


FIG. 5

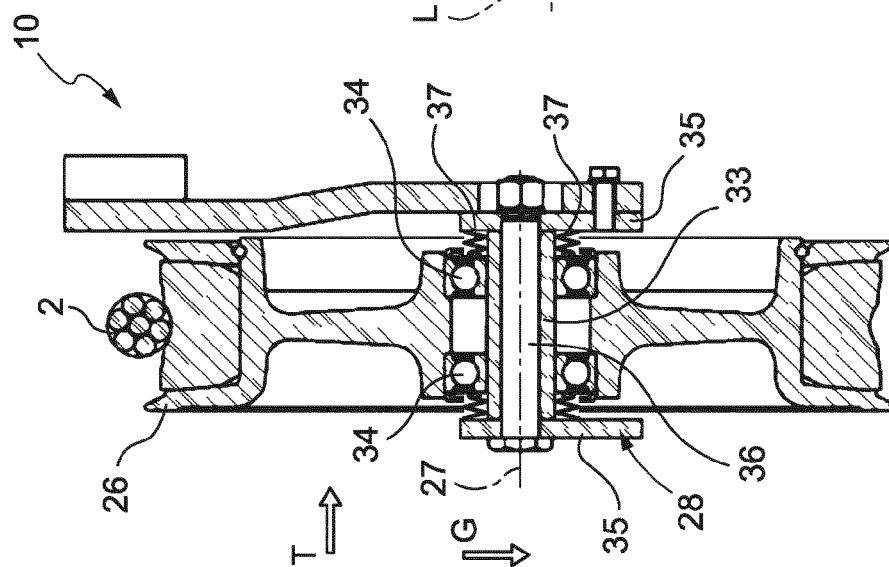


FIG. 6

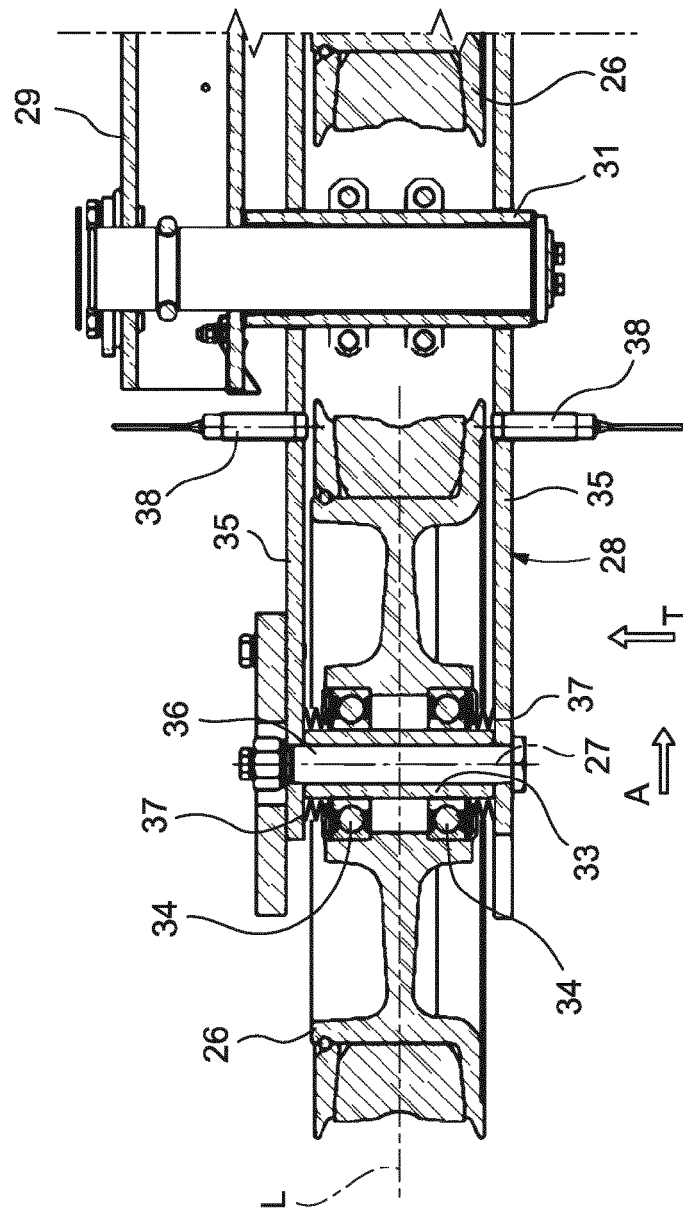


FIG. 7



EUROPEAN SEARCH REPORT

Application Number

EP 22 18 4637

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 2 557 013 A1 (ROLIC INVEST SARL [LU]) 13 February 2013 (2013-02-13)	1, 5, 8, 9, 12-16	INV. B61B12/02
A	* paragraphs [0002], [0007], [0034], [0047]; figures *	2-4, 6, 7, 10, 11	B61B12/06 B61B7/04
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