



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
19.03.2014 Bulletin 2014/12

(51) Int Cl.:
B61B 7/00 (2006.01)

(21) Application number: **13185060.4**

(22) Date of filing: **18.09.2013**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME

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(30) Priority: **18.09.2012 IT MI20121549**

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(54) **Cable Transportation System Control Method and Cable Transportation System**

(57) A method of controlling a cable transportation system having a departure and arrival area (12), a control device (20), and a mobile operator interface (30); the method including the steps of defining an operating range (40) allowing the operator full view of the departure and

arrival area (12); determining location of the mobile operator interface within the operating range (40); receiving a first operating command; and only executing the first operating command if the mobile operator interface is within the operating range (40).

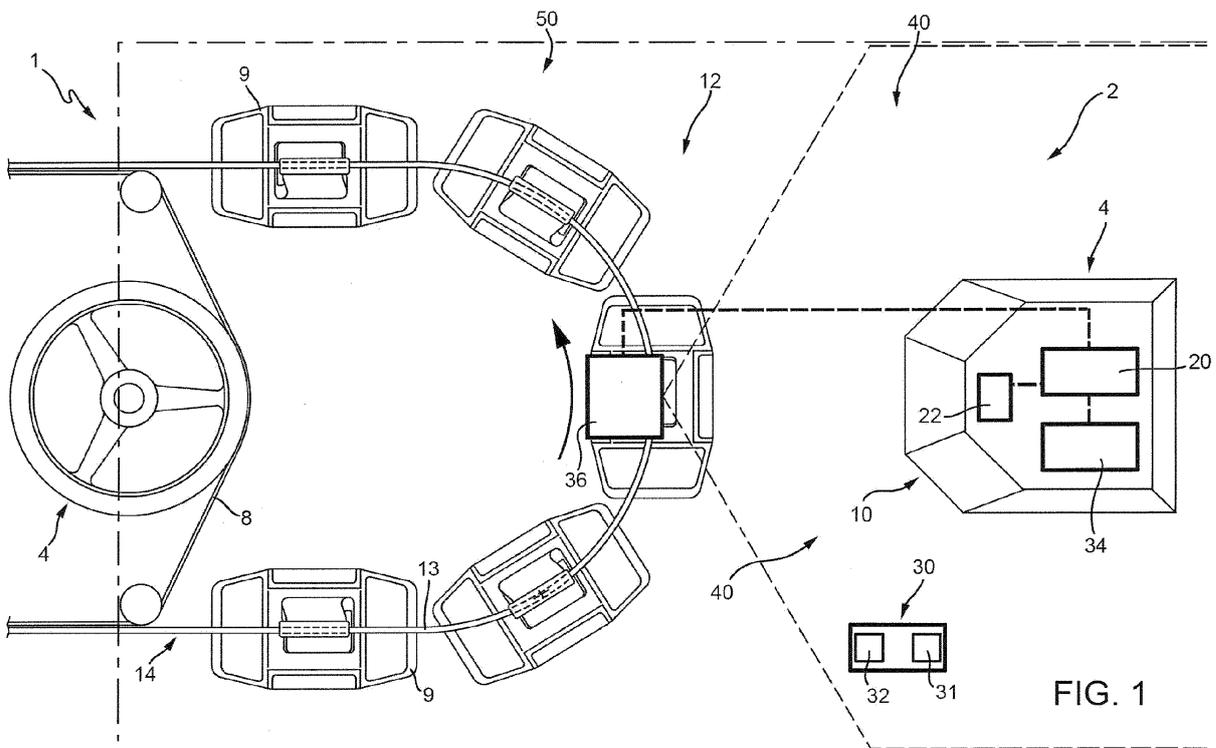


FIG. 1

Description

[0001] The present invention relates to a cable transportation system control method, and to said cable transportation system.

[0002] More specifically, the present invention relates to a method of controlling a cable transportation system comprising : a haul and/or supporting cable; a number of passenger cars clamped to the cable; at least one departure/arrival station having a first control booth; and a drive station having a second control booth.

[0003] Cable transportation systems are run by an operator stationed in the first or second control booth.

[0004] The first and second control booths are located to allow the operator a clear view of the entire departure/arrival area.

[0005] The operator, however, is confined to an operating station, with no freedom to move, or to assist passengers or perform other functions, within the departure/arrival area.

[0006] It is an object of the present invention to provide a cable transportation system control method designed to eliminate the above drawbacks of the known art.

[0007] According to the present invention, there is provided a method of controlling a cable transportation system comprising a departure and arrival area, a control device, and a mobile operator interface; the method comprising the steps of defining an operating range allowing the operator full view of the departure and arrival area; determining location of the mobile operator interface within the operating range; receiving a first operating command; and only executing the first operating command if the mobile operator interface is within the operating range.

[0008] By virtue of the present invention, the operator is allowed to move within the operating range, to assist passengers and check the cable transportation system.

[0009] In a preferred embodiment, the step of receiving the first operating command comprises the step of receiving a radiofrequency signal.

[0010] In a preferred embodiment, the step of determining location of the mobile operator interface within the operating range comprises positioning an infrared-ray receiver so as to only receive an infrared-ray enabling signal when the mobile operator interface is within the operating range.

[0011] In a preferred embodiment, the step of determining location of the mobile operator interface within the operating range comprises the step of determining reception of a first operating command enabling command associated with the enabling signal; and the step of executing the first operating command comprises only executing the first operating command if reception of the enabling signal is determined.

[0012] In a preferred embodiment, the method comprises the step of sending the first operating command together with the first operating command enabling command.

[0013] In a preferred embodiment, the method comprises receiving a second operating command; and executing the second operating command regardless of whether the mobile operator interface is within or outside the operating range.

[0014] In a preferred embodiment, the method comprises the step of stopping moving parts of the cable transportation system if the mobile operator interface is outside a further operating range comprising the operating range.

[0015] In a preferred embodiment, determining location of the mobile operator interface within the further operating range comprises the step of sending a location signal cyclically from the mobile operator interface to the control device.

[0016] It is an object of the present invention to provide a cable transportation system designed to eliminate the aforementioned drawbacks of the known art.

[0017] According to the present invention, there is provided a cable transportation system comprising a departure and arrival area, a control device, and a mobile operator interface; the control device being designed to determine location of the mobile operator interface within a given operating range; and the control device communicating with the mobile operator interface to receive a first operating command, and to only execute the first operating command when the mobile operator interface is within the operating range.

[0018] A non-limiting embodiment of the present invention will be described by way of example with reference to the attached drawings, in which :

Figure 1 shows a plan view, with parts removed for clarity, of a cable transportation system;

Figure 2 shows a side view of the Figure 1 cable transportation system.

[0019] Number 1 in Figure 1 indicates a cable transportation system comprising at least two departure and arrival stations 2 (only one shown in the drawings), each comprising a respective pulley 4; a haul cable 8 looped about pulleys 4; a number of transportation units 9 selectively connected to haul cable 8; and an operator booth 10.

[0020] Station 2 comprises a departure and arrival area 12 where passengers get on or off transportation units 9.

[0021] System 1 is an automatic clamp-on cable transportation system, and each departure and arrival station 2 comprises a guide 13 and an auxiliary drive device 14.

More specifically, on arriving at a departure and arrival station 2, transportation units 9 are released from haul cable 8 and moved along guide 13 by auxiliary drive device 14. And, on leaving a departure and arrival station 2, transportation units 9 are clamped to haul cable 8.

[0022] The present invention, however, also applies to cable transportation systems in general, not only those with an automatic clamp-on facility.

[0023] System 1 comprises a control device 20 for con-

trolling system 1 and designed to receive operator commands and to perform various system functions, such as : rotating pulley 4 by means of a motor (not shown in the drawings); stopping pulley 4; reducing the speed of pulley 4; and controlling auxiliary functions, such as opening or closing doors.

[0024] Departure and arrival station 2 comprises operator booth 10, which comprises a fixed operator interface 22 communicating with control device 20 and designed to receive operating commands from the operator. Operator booth 10 is situated at departure and arrival station 2 to allow the operator a clear view of the entire departure and arrival area 12. The fixed operator interface 22 comprises controls for stopping pulley 4, starting pulley 4, reducing the speed of pulley 4, and controlling auxiliary functions, such as opening or closing doors.

[0025] Cable transportation system 1 comprises a mobile operator interface 30, e.g. a remote control, which communicates with control device 20 to control system 1, and which comprises controls for stopping pulley 4, starting pulley 4, reducing the speed of pulley 4, and controlling auxiliary functions.

[0026] Mobile operator interface 30 comprises a radiofrequency transmitter block 31 and an infrared-ray transmitter block 32. More specifically, mobile operator interface 30 sends operation commands via radiofrequency signals, and enabling commands via infrared-ray signals. Radiofrequency transmitter block 31 sends radiofrequency signals by generating an electromagnetic wave in the radiofrequency band with a frequency of 6 MHz to 246 GHz, and preferably 433.005 MHz to 434.790 MHz. Infrared-ray transmitter block 32 generates an electromagnetic wave in the infrared band with a wavelength of 10 μ m to 700 nm, and preferably 900 nm to 1000 nm.

[0027] System 1 comprises a radiofrequency receiver 34 comprising an antenna 35 (Figure 2), which, in a preferred, non-limiting embodiment of the present invention, is located on top of operator booth 10. Radiofrequency receiver 34 communicates with control device 20 to supply the radiofrequency signals from radiofrequency transmitter block 31.

[0028] Mobile operator interface 30 is designed to send the enabling command via the enabling signal transmitted by infrared-ray transmitter block 32.

[0029] System 1 also comprises an infrared-ray receiver 36 preferably cable-connected to control device 20.

[0030] Infrared-ray receiver 36 receives the infrared rays transmitted by infrared-ray transmitter block 32. Infrared-ray receiver 36 is located inside system 1, in such a position that its operating range defines an operating range 40 (shown by the dash line in Figure 1) in turn defining an area allowing the operator a clear view of the entire departure and arrival area 12.

[0031] In other words, mobile operator interface 30 can only communicate with infrared-ray receiver 36 when mobile operator interface 30 is within operating range 40. In fact, infrared-ray transmitter block 32 and infrared-ray receiver 36 only communicate when they are in 'visual

contact', i.e. when there are no obstacles between infrared-ray transmitter block 32 and infrared-ray receiver 36. Consequently, when the operator is outside operating range 40, no enabling commands can be sent to control device 20 by infrared-ray transmitter block 32.

[0032] Radiofrequency transmitter block 31 and radiofrequency receiver 34 have an operating range defining a further operating range 50 (shown by the long and short-dash line in Figure 1) comprising operating range 40. The further operating range 50 comprises at least the interior of the entire departure and arrival area 12. In other words, radiofrequency transmitter block 31 and radiofrequency receiver 34 are designed with a power, frequency, and antenna position to cover further operating range 50.

[0033] As stated, mobile operator interface 30 is designed to send operating commands via radiofrequency transmitter block 31. For example, mobile operator interface 30 is designed to send operating commands to: stop pulley 4, start pulley 4, reduce the speed of pulley 4, and perform auxiliary functions.

[0034] Control device 20 is designed to determine location of mobile operator interface 30 within operating range 40. In actual use, control device 20 receives first operating commands and the enabling command from mobile operator interface 30. More specifically, control device 20 receives first operating commands via radiofrequency receiver 34, and the enabling command via infrared-ray receiver 36. In actual use, control device 20 receives a first operating command from radiofrequency receiver 34; determines simultaneous reception of the enabling command signal from infrared-ray receiver 36; acts on pulley 4 or other component parts of cable transportation system 1 according to the first operating command received, if the above condition is confirmed; and does not execute the first operating command received, if the above condition is not confirmed. In other words, control device 20 only executes first operating commands if the operator is within operating range 40, with a clear view of the entire departure and arrival area 12.

[0035] The first operating commands comprise a command to start pulley 4, or a command to authorize start-up of pulley 4.

[0036] In an alternative embodiment not shown in the drawings, the control device may determine location of the mobile operator interface within the operating range by means of an RFID system, GPS system, radiofrequency signal triangulation, or other locating methods.

[0037] Control device 20 is designed to receive a second operating command, and to execute the second operating command regardless of whether mobile operator interface 30 is within or outside operating range 40. More specifically, the second operating command is transmitted to radiofrequency receiver 34 by radiofrequency transmitter block 31 of mobile operator interface 30, and is executed by control device 20. The second operating command may comprise a command to stop the moving parts of the system, or to reduce the speed of pulley 4.

The second operating commands therefore differ from the first by not requiring enabling signals to determine the location of the mobile operator interface.

[0038] Control device 20 is also designed to stop moving parts of system 1 - pulley 4, cars 9, and all the other moving parts within system 1 - when mobile operator interface 30 is outside further operating range 50 comprising operating range 40. To do this, mobile operator interface 30 is designed to cyclically transmit a location signal indicating its location within further operating range 50. The location signal is transmitted by means of a radiofrequency signal from radiofrequency transmitter block 31 to radiofrequency receiver 34.

[0039] Control device 20 cyclically determines reception of the location signal, and, in the event of no reception, shuts down the moving parts of system 1. In other words, if control device 20 fails to receive the location signal, this means mobile operator interface 30 is no longer within the further operating range, so control device 20 shuts down the moving parts of system 1.

[0040] Clearly, changes may be made to the system and method as described herein without, however, departing from the scope of the accompanying Claims.

Claims

1. A method of controlling a cable transportation system comprising a departure and arrival area (12), a control device (20), and a mobile operator interface (30); the method comprising the steps of defining an operating range (40) allowing the operator full view of the departure and arrival area (12); determining location of the mobile operator interface within the operating range (40); receiving a first operating command; and only executing the first operating command if the mobile operator interface is within the operating range (40).
2. A method of controlling a cable transportation system (1) as claimed in Claim 1, wherein the step of receiving the first operating command comprises the step of receiving a radiofrequency signal.
3. A method of controlling a cable transportation system (1) as claimed in Claim 2, wherein the step of determining location of the mobile operator interface within the operating range (40) comprises positioning an infrared-ray receiver (36) so as to only receive an infrared-ray enabling signal when the mobile operator interface is within the operating range (40).
4. A method of controlling a cable transportation system (1) as claimed in Claim 3, wherein the step of determining location of the mobile operator interface (30) within the operating range (40) comprises the step of determining reception of a first operating command enabling command associated with the enabling signal; and the step of executing the first operating command comprises only executing the first operating command if reception of the enabling signal is determined.
5. A method of controlling a cable transportation system (1) as claimed in Claim 4, and comprising the step of sending the first operating command together with the first operating command enabling command.
6. A method of controlling a cable transportation system (1) as claimed in any one of the foregoing Claims, and comprising receiving a second operating command; and executing the second operating command regardless of whether the mobile operator interface (30) is within or outside the operating range (40).
7. A method of controlling a cable transportation system (1) as claimed in any one of the foregoing Claims, and comprising the step of stopping moving parts of the cable transportation system (1) if the mobile operator interface (30) is outside a further operating range (50) comprising the operating range (40).
8. A method of controlling a cable transportation system (1) as claimed in Claim 7, wherein determining location of the mobile operator interface (30) within the further operating range comprises the step of sending a location signal cyclically from the mobile operator interface (30) to the control device (20).
9. A cable transportation system comprising a departure and arrival area (12), a control device (20), and a mobile operator interface (30); the control device (20) being designed to determine location of the mobile operator interface (30) within a given operating range (40); and the control device (20) communicating with the mobile operator interface (30) to receive a first operating command, and to only execute the first operating command when the mobile operator interface (30) is within the operating range (40).
10. A cable transportation system as claimed in Claim 9, wherein the control device (20) comprises a radiofrequency receiver (34) designed to receive a first operating command via a radiofrequency signal.
11. A cable transportation system as claimed in Claim 10, wherein the control device (20) comprises an infrared-ray receiver (36) located within the cable transportation system (1) to only receive an infrared-ray enabling signal when the mobile operator interface (30) is within the operating range (40).
12. A cable transportation system as claimed in Claim

11, wherein the control device (20) is designed to determine reception of a first operating command enabling command coupled to the enabling signal; and to only execute the first operating command if reception of the enabling signal is determined. 5

13. A cable transportation system as claimed in Claim 12, wherein the mobile operator interface (30) comprises a radiofrequency transmitter (31) for transmitting the first operating command together with the first operating command enabling command. 10

14. A cable transportation system as claimed in any one of Claims 9 to 13, wherein the control device (20) is designed to receive a second operating command, and to execute the second operating command regardless of whether the mobile operator interface (30) is within or outside the operating range (40). 15

15. A cable transportation system as claimed in any one of the foregoing Claims, wherein the control device (20) is designed to stop moving parts of the cable transportation system (1) if the mobile operator interface (30) is outside a further operating range (50) comprising the operating range (40). 20 25

16. A cable transportation system as claimed in Claim 15, wherein the mobile operator interface (30) is designed to transmit a location signal cyclically to the control device (20) to indicate location of the mobile operator interface (30) within the further operating range. 30

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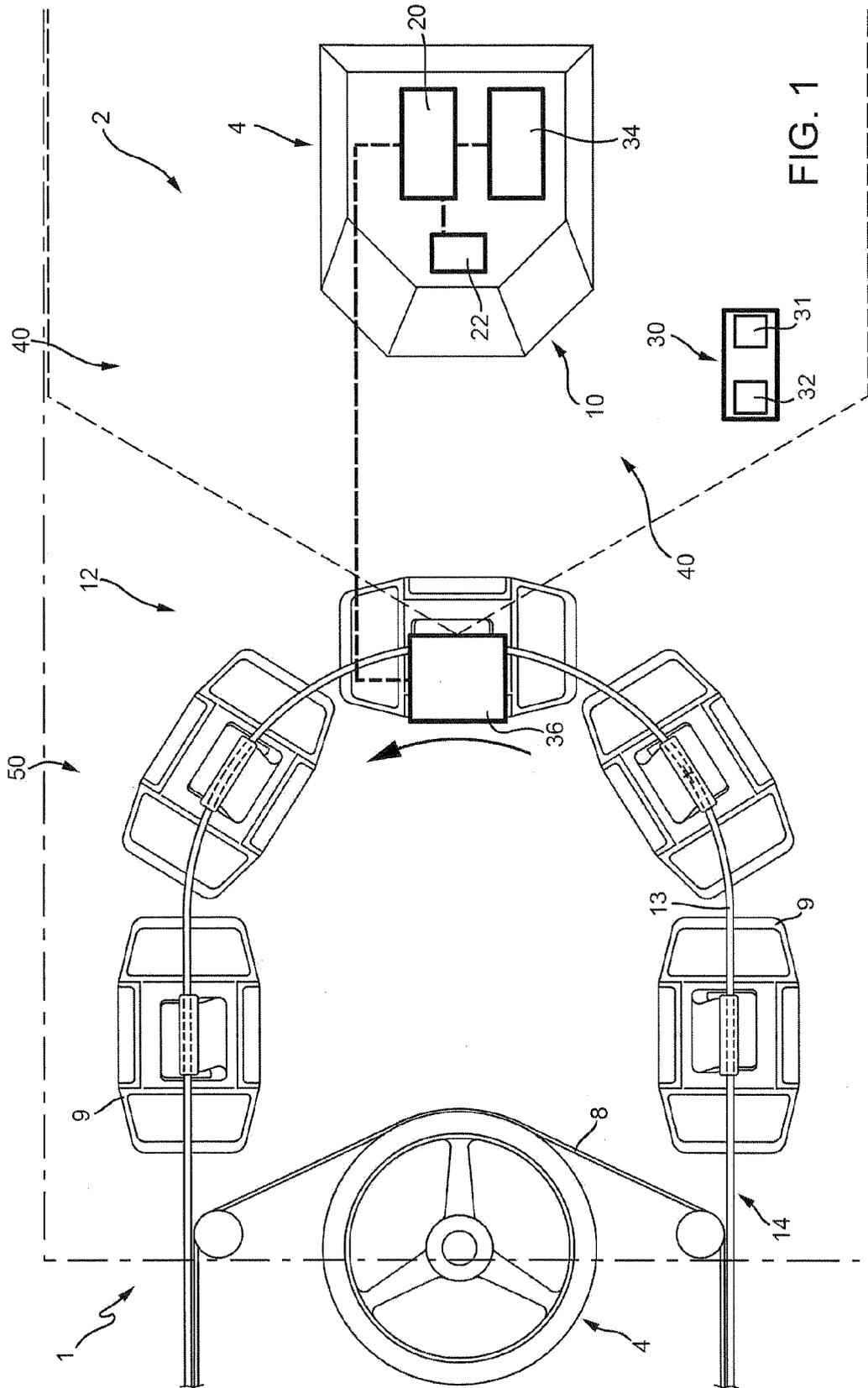


FIG. 1

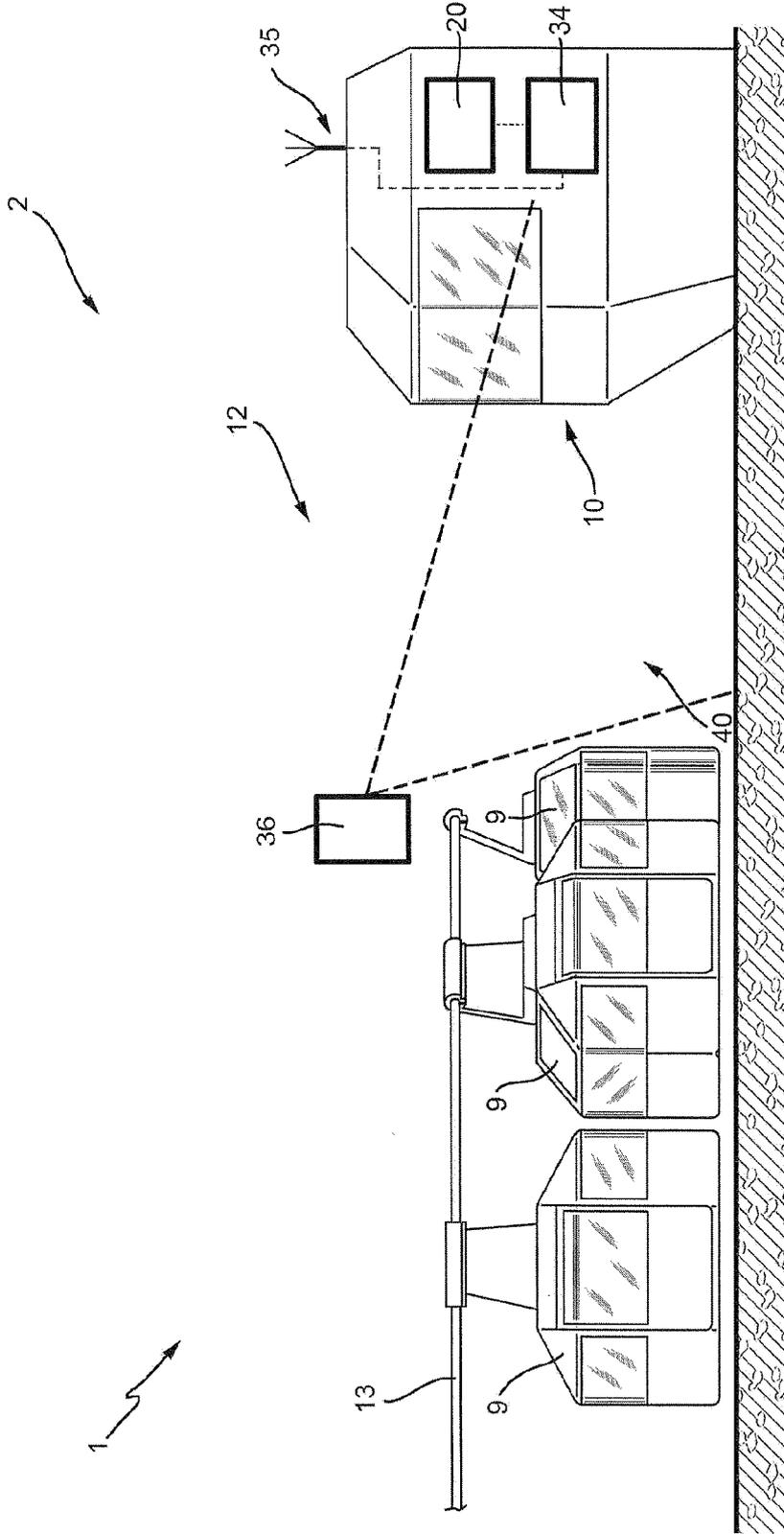


FIG. 2



EUROPEAN SEARCH REPORT

Application Number
EP 13 18 5060

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 306 815 A1 (SKIDATA AG [AT]) 2 May 2003 (2003-05-02) * figure 2 *	1,9	INV. B61B7/00
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			TECHNICAL FIELDS SEARCHED (IPC)
			B61B G07B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 28 November 2013	Examiner Lorandi, Lorenzo
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 18 5060

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-11-2013

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