



(11) **EP 2 591 973 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.05.2013 Bulletin 2013/20

(51) Int Cl.:
B61L 15/00 (2006.01)

(21) Application number: **12185035.8**

(22) Date of filing: **19.09.2012**

(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

(30) Priority: **09.11.2011 RU 2011145185**

(71) Applicants:
• **Vakhnina, Nina Alexandrovna**
129110 Moscow (RU)
• **Uvarov, Sergey Sergeevich**
105037 Moscow (RU)

(72) Inventors:
• **Vakhnina, Nina Alexandrovna**
129110 Moscow (RU)
• **Uvarov, Sergey Sergeevich**
105037 Moscow (RU)

(74) Representative: **Teipel, Stephan**
Lederer & Keller
Patentanwälte
Unsöldstrasse 2
80538 München (DE)

(54) **Multi-level distributed information system for multi-train transport**

(57) The invention relates to information transfer systems in a multi-train transport and/or two-cabin train. The multi-level distributed information system for the multi-train transport comprises a system control equipment 1, a voice announcement and communication equipment 2, an equipment 3 to control a high-speed communication line, a high-speed communication line equipment 4, a voice announcement playback equipment 5, a «passenger-driver» and the «panic button» communication de-

vice 6, a controlled power supply unit 7, an equipment 8 of the low-speed communication line of the head carriage, an equipment 9 of the low-speed communication line of the hook-on carriage, a high-speed communication line 10, a low-speed communication line 11, a communication line 12 of control processors, a "cabin-cabin" and "carriage-cabin" communication line 13, a loudspeaking voice announcement line 14.

EP 2 591 973 A2

Description

[0001] The invention relates to information systems intended for information transfer from automatic devices, communication systems, video cameras arranged in carriages of a train set to control devices as a rule disposed in driver's cabins of the train set, as well as for transmission from information system control devices of control information to automatic devices, communication systems, video cameras and symbol, voice and multimedia information to the passengers and attendants of the multi-train transport. The invention is intended for application on multi-train transport and/or two-cabin transport, including passenger trains of the suburban traffic, passenger and freight trains, railway articulated locomotives, underground trains, monorail trains, lorry convoys, trams.

[0002] The units (carriages) of a multi-train transport are characterized by the presence of distributed systems of engine control, brake systems, lighting control systems, conditioning systems, cooling, heating, automatic doors and other distributed systems, require a centralized control of these systems and collection of information on their condition. For organization of control and information gathering, as a rule, use is made of an information line assigned for each distributed system.

[0003] The modern multi-train transportation means are provided with a large number of new distributed systems, which were not used earlier on multi-train transport and for their centralization there is no individual information line for communication and control. The greatest complexity in the information transfer in multi-train transport present systems requiring high-speed and reliability of information transfer, such as security television systems (video monitoring) and multimedia announcement.

[0004] At the same time, the fire and security systems should function not only in run of the train in the presence of power supply from the contact electric overhead systems or from diesel, petrol and other engines, but also in a period when the transport is stationary at places of long-time parking, at power supplies from backup storage batteries in the absence of contact with a power supply system or with out-of-operation drive engines.

[0005] On the other hand the multi-train transport is subject to the rearrangements associated with an increase or reduction of units of the multi-train transport (carriages) in the train and/or changeover of some carriages with the others. In this case the information system representing a digital data transfer network requires address relocation of linearly distributed commutators or other devices connected to the network. The urgency of the problem of address relocation of the connected devices requires not only changes of their list in the control computer memory, but also establishing an order of their sequence order in the train or establishing a correspondence of the logical addresses of the digital devices to the physical numbers of carriages in the train which is required for the unambiguous correspondence arranged on train of the devices distributed in the train to the place

of their actual layout.

[0006] Besides, during the rearrangements of multi-train transport of the suburban traffic trains and locomotives on the Russian railways and on a municipal transport often use is made of so-called system of many units at which two and more previously formed sets of trains are rearranged in one train by coupling of two head carriages. In this case the information system should work as a centralized control system from one of cabins of the head carriage of the train (locomotive) of the new train.

[0007] The closest analog is application US 2010/0004805 of 1/11/2009 cl. G05D 1/00, filed for rendering a patent for the invention «Computerized onboard system for train control». The system includes a processor, remote input/output units for transmission of commands from the processor and reception of the data from the controlled equipment including equipment for monitoring and control of the engine, conditioning and cooling, door closing mechanism, brakes, including a «black box», sensors of protection and fire enunciators, as well as a display, a data transfer subnet connected to the processor and remote input/output units, a communication line for image transfer from video cameras, video units, with the video cameras connected thereto, gateways for sending video images to the display, video observation equipment, a communication line for image transfer to television monitors installed in the train carriages, a communication line for transmission of the sound data.

[0008] The disadvantages of this system are as follows. The connection of controlled and control devices of the train is carried out both directly to the main data transfer network and through remote input/output units. Such a connection requires individual addressing of each of the directly connected to the network Devices and each of the remote input/output unit that results in practical complexity of unification of address space of the main network of the train. The system does not operate when forming a train of two and more trains formed previously, as well as in case of a change of the order of connection of the carriages or connection additional hook-on carriages into an earlier formed train. The system also does not provide detection of the centers of fire when the train rests in a depot or on a side-track when the train is in a so-called mode «cold parking» or «external parking». The signaling also does not provide control over unauthorized penetration into carriages of a train and does not perform diagnostics of a technical condition of subsystems of a train with the notification of the train driver or technical services of a depot. Besides, the scheme of connection of the fire-prevention equipment together with other devices to the same interfaces, does not allow one to carry out selective power supply from a backup source for performing the function of protection of the train in the "parking" condition.

[0009] The purpose of the present invention is to create an information system providing a possibility of connec-

tion in a single system of information systems of two and more transports connected by head carriages without necessity reprogramming each of them; providing invariance of the transport information system to rearrangement (connection of additional hook-on carriages, removal of carriages, swap of carriages) of the train; providing safety functions (security and fire-prevention) of the train in the "parking" condition.

[0010] This result is attained due to the fact that the multi-level distributed information system for the multi-train transport including at least, one head carriage and one hook-on carriage, comprises an equipment for a high-speed communication line, an equipment for control of the high-speed communication line, a system control equipment, a low-speed communication line equipment, a voice announcement and communication equipment, a voice announcement playback equipment, a high-speed communication line, a low-speed communication line, a communication of control processors, a «cabin-to-cabin» and «carriage-to-cabin» communication line, a loudspeaking announcement line, a «passenger-to-driver» and «panic button» intercommunication device, a controlled power supply unit.

[0011] In so doing the head carriage is provided with a high-speed communication equipment, a high-speed communication line control equipment, a system control equipment, a low-speed communication line equipment, a voice announcement and communication equipment, loudspeaking voice announcement equipment, a high-speed communication line, a low-speed communication line, a communication of control processors, a «cabin-to-cabin» and «carriage-to-cabin» communication line, a loudspeaking announcement line, a «passenger-to-driver» and «panic button» intercommunication device, a controlled power supply unit, and the hook-on carriage of the train is provided with a high-speed communication equipment, a low-speed communication line equipment, a voice announcement playback equipment, a high-speed communication line, a low-speed communication line, a «cabin-to-cabin» and «carriage-to-cabin» communication line, a loudspeaking announcement line, a «passenger-to-driver» and «panic button» intercommunication device, the controlled power supply unit.

[0012] The system control equipment includes a control processor controlled from a control desk connected to the high-speed communication line control equipment, a processor controlled low-speed communication line, a communication of control processors with voice announcement and communication equipment and through communication interfaces with a radio station, a position-determining system, a communication system and a security system, a removable memory module for storing the system and train configuration and a «black box» equipment for recording the messages on the equipment and train condition connected to the control processor. In so doing the communication of control processors connects the control processor of the train to control processor of the head carriage of another connected trans-

port.

[0013] The voice announcement and communication equipment includes head carriage cabin amplifying intercommunication device and an associated loudspeaker of the driver's cabin and microphone typeface of the driver, thus the amplifying intercommunication device is connected to the control processor via the low-speed communication line equipment, the «passenger-to-driver» and «panic button» intercommunication device, the loudspeaking announcement line and the «cabin-to-cabin» and «carriage-to-cabin» communication line.

[0014] The equipment for controlling the high-speed communication line includes a server of a video monitoring and multimedia announcement subsystem controlled from the control desk and the associated equipment of a video archive and the monitor of a subsystem of video monitoring, in which case the control processor is connected through the server to the high-speed communication line.

[0015] The high-speed communication equipment includes a switching unit installed in the high-speed communication line and connected at least to one television monitor and/or one video camera.

[0016] The voice announcement playback equipment is connected to the loudspeaking announcement line.

[0017] The «passenger-to-driver» and «panic button» intercommunication device are connected to the controlled processor are connected to the amplifying intercommunication device through the "cabin-cabin" and "carriage-cabin" communication line.

[0018] The controlled power supply unit includes a switching unit controlled by the processor whose output is connected to a power supply circuit of the train information system of a train which is on route and in the "train parking" mode, a backup storage battery, whose output is connected to the switching unit capable of being connected in the «train parking» mode, and a voltage converter of an overhead system or a generator whose output is connected to the switching unit capable of being connected when train is on the route.

[0019] The low-speed communication line equipment of the head carriage of the train includes a controlled processor and an associated controlled power supply unit, a power supply monitoring unit, a loudspeaker announcement control unit, a door condition control and monitoring unit, train technical subsystems condition monitoring unit, an interface for communication with the train distributed systems, a fire extinguishing system starting device, at least one intrusion sensor, one fire detector, one internal information display and one external information display, in so doing the controlled processor is connected to the «passenger-to-driver» and «panic button» intercommunication device, while the loudspeaker announcement control unit is connected to the amplifying intercommunication device.

[0020] The low-speed communication line equipment of the hook-on carriage of the train includes a controlled processor and an associated controlled power supply

unit, the power supply monitoring unit, the door condition control and monitoring unit, the train technical subsystems condition monitoring unit, the interface for communication with the train distributed systems, the fire extinguishing system starting device, at least one intrusion sensor, one fire detector, one internal information display and one external information display, the controlled processor being connected to the «passenger-to-driver» and «panic button» intercommunication device.

[0021] The fire extinguishing system starting device includes an AND circuit connected to the controlled processor whose inverting input is connected to an overhead system voltage converter or to a generator whose output through an "OR" circuit is connected to the fire extinguishing system, and the second input of the «OR» circuit is connected to a fire extinguishing system manual starting device.

[0022] The presence in each carriage connected to a low-speed communication line with a controlled processor with an individual logical address, to which all other devices of the low-speed communication line are connected directly and/or through general-purpose and/or special interfaces, and connection to the high-speed communication line of only the switching unit with individual logical addresses to which all other devices of the high-speed communication line are connected directly or through interfaces and/or signal conversions, allows one to unify the train addressing system and to provide operation of the information system in case of change of the order of connection of carriages or coupling additional hook-on carriages to an earlier formed train. In so doing the table of sequence of addresses of the controlled processors and switching unit registers is recorded in the removable configuration memory module connected to the control processor in advance. The table can be changed at rearrangements of the train by the system operator, either in the configuration memory module or in the control processor. In this case, the procedure of recording or changing the addresses does not require a change of the equipment and system software.

[0023] The presence of a communication of control processors allows one to eliminate a radical change of the configuration of train information system when forming the train of two or more train sets formed earlier and connected via head carriages.

[0024] The organization of electric power supply of the multi-level information system through three circuits: a circuit of main power supply from the overhead system voltage converter or from the generator, a circuit of backup power supply from the backup storage battery and a circuit of main power supply on the route and backup power supply in the "parking" mode through the switching unit controlled by the controlled processor provides a possibility of long-term operation with an output of an emergency signal by means of an onboard radio station through a communication interface, a security and fire-prevention system realized in a low-speed communication line with application of electronic components having

low power consumption, and short-term operation at an emergency signal from a controlled processor of high-speed devices of video monitoring and video recording.

[0025] The fire extinguishing system starting device provides blocking of the start of the fire extinguishing systems including accidental, on route of the train for protection of passengers against effect of reagents of fire extinguishing system, said device providing the passage of an automatic start signal only in the absence of power supply from the overhead system voltage converter or generator, i.e. at train parking. It provides reliability of fire extinguishing system and safety of passengers at a fire initiation.

[0026] Such improvements allow one to expand functional capabilities of Signaling due to a possibility appearance of controlling an unauthorized penetration into carriages of an electric train and monitoring the technical condition of all subsystems of the electric train (brake, engines, mounted axles, etc.) that raises the safety of the electric train passengers, and to provide inspection of possible fire and unauthorized penetration into electric train carriages in the «cold parking» mode that can increase the electric train service life.

[0027] The list of drawings.

Fig. 1 - a functional diagram of an information system of a train.

Fig. 2 - a functional diagram of an information system of a head carriage of a train.

Fig. 3 - a functional diagram of an information system of a hook-on carriage of a train.

Fig. 4 - a structural diagram of a train formed by coupling head carriages of two trains.

[0028] The multi-level distributed information system for a multi-train transport train (Fig. 1) comprises equipment 1 to control a system (Fig. 2), an equipment 2 for voice announcement and communications, an equipment 3 to control a high-speed communication line, an equipment 4 of a high-speed communication, a playing back sound equipment 5 for voice announcement, a device 6 of "passenger-driver" and the «panic button» signal, a controlled power supply unit 7, an equipment 8 of a low-speed communication line of the head carriage, an equipment 9 of the low-speed communication line of the hook-on carriage (Fig. 3), a high-speed communication line 10, a low-speed communication line 11, a communication line 12 of the control processors, a communication line 13 "cabin-cabin" and "carriage-cabin", a line 14 of loudspeaking voice announcement.

[0029] The system control equipment 1 includes control processor 16 controlled from control desk 15, a removable memory module 17 of a system and train configuration and a «black box» equipment 18 for recording messages on the equipment and train condition connected to the control processor 16 which is also connected to the equipment 3 to control the high-speed communication line 10, a low-speed communication line 11, a con-

trolled processor 19, a communication line 12 of a control processors 16, an equipment 2 of voice announcement and communication through communication interfaces 20, 21 and 22, respectively, with a radio station, a security system and a position-determining system of communication systems.

[0030] The communication line 12 of the control processors connects the train control processor 16 with the control processor of the head carriage of the other connected train (Fig. 4).

[0031] The voice announcement and communication equipment 2 includes amplifying intercommunication device 24 installed in the head carriage driver's cabin and an associated loudspeaker 25 and microphone typeface 26 installed in the driver's cabin, the amplifying intercommunication device 24 being connected to the control processor 16 from which signals of automatic announcement are transmitted to the device 24, an equipment 8 of the low-speed communication line 11, a "passenger-driver" and the «panic button» device 6, a loudspeaking voice announcement line 14, and a "cabin-cabin" and "carriage-cabin" communication line 13.

[0032] The equipment 3 to control the high-speed communication line 10 includes a server 28 controlled from a panel 27 of video monitoring and multimedia announcement subsystems and connected to a video archive equipment 29 and a monitor 30 of the video monitoring subsystem, the control processor 16 being connected to the high-speed communication line 10 through the server 28.

[0033] The equipment 4 of the high-speed communication line 10 includes a switching unit 31 installed in the high-speed communication line 10 and connected at least to one television monitor 32 and/or to one video camera 33.

[0034] The playback equipment 5 of the loudspeaking voice announcement is connected to the amplifying intercommunication device 24 through the line 14.

[0035] The signal «passenger-driver» and the «panic button» device 6 is connected to the controlled processor 19 and to the amplifying intercommunication device 24 through "cabin-cabin" and "carriage-cabin" through the communication line 13.

[0036] The controlled power supply unit 7 includes 19 a switching unit 34 controlled by the processor switching unit output being connected to the power supply circuit of the information system of the running train, and in the «parking» mode use the power is supplied from the backup storage battery 35 whose output is connected to the switching unit 34 providing its connection in «parking» mode, and a voltage converter 36 connected to the overhead power system or a generator whose output is connected to the switching unit 34 capable of being connected when train is on the route.

[0037] The equipment 8 of the low-speed communication line 11 of the head carriage of the train includes the controlled processor 19 and the associated controlled power supply unit 7, a power supply monitoring unit 37,

a loudspeaking announcement system control unit 38, a door condition control and monitoring unit 39, a unit 40 for monitoring the condition of the technical subsystems of the train, an interface 41 for communication with the distributed systems of the train, a device 42 for starting the fire extinguishing system, at least one security sensor 43, one fire detector 44, one internal information display 45 and one external information display 46, the controlled processor 19 being connected to the «passenger-driver» and the «panic button» intercommunication device 6, and the loudspeaking announcement system control unit 38 being connected to the amplifying intercommunication device 24. In so doing the controlled processor 19 uses the signal sent through the loudspeaking announcement system control unit 38 to the amplifying intercommunication device 24 for switching-on the unit 38 by the loudspeaking announcement system in a driver's cabin of the head carriage and for switch-off the signal in the driver's cabin of the driven head carriage.

[0038] The equipment 9 of the low-speed communication line of the train hook-on carriage includes the controlled processor 19 and the associated controlled power supply unit 7, power supply monitoring unit 37, door condition control and monitoring unit 39, unit 40 for monitoring the condition of the technical subsystems of the train, interface 41 for communication with train distributed systems, device 42 for starting the fire extinguishing system at least one security sensor 43, one fire detector 44, one internal information display 45 and one external information display 46, the controlled processor 19 being connected to the «passenger-driver» and the «panic button» intercommunication device 6.

[0039] The device 42 for starting the fire extinguishing system includes an "AND" circuit 47 connected to the controlled processor 19 whose inverting input is connected to the overhead system voltage converter 36 or to the generator whose output through an «OR» circuit 48 is connected to a fire extinguishing system 49, and the second input of the «OR» circuit 48 is connected to a device 50 for manual starting of the fire extinguishing system via backup power supply circuit.

[0040] The high-speed communication line 10, the low-speed communication line 11, the communication line 12 of the control processors 16, the "cabin-cabin" and "carriage-cabin" line 13/ and the loudspeaker voice announcement communication lines 14 of the adjacent carriages of the train are connected by means of inter-carriage connections 51, 52, 53, 54 and 55, accordingly.

[0041] The multi-level information system power supply is organized via three circuits: circuit EC of the main power supply from the overhead system voltage converter 36 or from the generator, circuit Er of backup power supply from the backup storage battery 35, and circuit Esrt of the main power supply on the route and backup power supply in the "parking" condition through the switching unit 34 controlled by the controlled processor 19. The equipment of system is connected to these circuits of power supply depending on it functional purpose.

[0042] The circuit Ec of the main power supply which is not available on a train in "parking" (at stations, in depots, etc.) under conditions of disconnection of the overhead power system or at an idle traction engine, the equipment of system which is not performing functions of protection of the train in "parking" is connected to: the television monitors 32, the monitor of the video monitoring subsystem 30 with a touch screen, the control desk 27 of the subsystem of video monitoring and multimedia announcement, the interface for 21 for communication with onboard security system, the interface 22 for communication with the position-determining and communication systems, the loudspeaking announcement system control unit 38, the internal information display 45, the external information display 46, the power supply monitoring unit 37, the door condition control and monitoring unit 39, the unit 40 for monitoring the condition of the technical subsystems of the train, the interface 41 for communication with the train distributed systems, the amplifying intercommunication device 24, and voice announcement playback equipment 5.

[0043] The circuit Ep of the backup power supply system is connected to the equipment performing functions of protection of the train in "parking" and requiring permanent power supply: the switching unit 34, the removable memory module 17 storing the train configuration data, the interface 20 for communication with the radio station, the control processor 16, the «black box» equipment 18, the control desk 15 of the control processor 16, the controlled processor 19, the security sensors 43, the fire detectors 44, the fire extinguishing system starting device 42, the «panic button» 6.

[0044] The circuit Ecpt of the main power supply on the route and backup power supply in "parking" is connected to the equipment providing video monitoring and the video recording of events at actuation of the security and/or fire-prevention system. In parking this equipment is connected to the circuit Ec of the main power supply through the switching unit 34, and in "parking" it is connected to the circuit Er of the backup power supply when the switching unit 34 receives a command from the controlled processor 19. The power supply equipment connected to the switching unit 34 includes the following component: the video cameras 33, the server 28 of the video monitoring and multimedia announcement subsystems, the switching unit 31 of the high-speed communication line 10 and the video archive equipment 29.

[0045] The distributed equipment system provides long-term operation, with output of an emergency signal by means of the onboard radio station through the communication interface 20, the security and fire-prevention system implemented in the low-speed communication line 11 with application of electronic components having low energy consumption, and short-term operation, if needed, at arrival of an emergency signal from the controlled processor 19 of the high-speed video monitoring and video recording devices.

Claims

1. A multi-level distributed information system for a multi-train transport including at least one head carriage and one hook-on carriage comprises a high-speed communication equipment, an equipment to control a high-speed communication line, a system control equipment, a low-speed communication line equipment, a voice announcement and communication equipment, a voice announcement playback equipment, a high-speed communication line, a low-speed communication line, a communication of control processors, a «cabin-to-cabin» and «carriage-to-cabin» communication line, a loudspeaking announcement line, a «passenger-to-driver» and «panic button» intercommunication device, a controlled power supply unit.
2. System as claimed in claim 1, **characterized in that** the head carriage of the train is provided with a high-speed communication equipment, a high-speed communication line control equipment, a system control equipment, a low-speed communication line equipment, a voice announcement and communication equipment, a voice announcement playback equipment, a high-speed communication line, a low-speed communication line, a communication line of control processors, a «cabin-to-cabin» and «carriage-to-cabin» communication line, a loudspeaking announcement line, a «passenger-to-driver» and «panic button» intercommunication device, a controlled power supply unit.
3. The system as claimed in claim 1, **characterized in that** the hook-on carriage of the train, is provided with a high-speed communication equipment, a low-speed communication line equipment, a voice announcement playback equipment, a high-speed communication line, a low-speed communication line, a «cabin-to-cabin» and «carriage-to-cabin» communication line, a loudspeaking announcement line, a «passenger-to-driver» and «panic button» intercommunication device, a controlled power supply unit.
4. The system as claimed in claim 1 or 2, **characterized in that** the system control equipment includes a control processor controlled from a control desk and connected to a high-speed communication line control equipment, a low-speed communication line, a controlled processor, a communication line of control processors, a voice announcement and communication equipment connected to a radio station through communication interfaces, a position-determining system, a communication system and security system, a removable memory module for storing the system and train configuration, and a «black box» equipment for recording messages and system

equipment and train condition connected to the control processor.

5. The system as claimed in claim 1 or 2, **characterized in that** the communication line of the control processors connects the control processor of the train to the control processor of the head carriage of another train to be connected. 5
6. The system as claimed in claim 1 or 2, **characterized in that** the voice announcement and communication equipment includes an amplifying intercommunication device installed in the head carriage driver's cabin and connected to the loudspeaker in the driver's cabin and a microphone typeface of the driver, the amplifying intercommunication device being connected to the control processor, the low-speed communication line equipment, the «passenger-to-driver» and «panic button» intercommunication device, the loudspeaking announcement line, and to the «cabin-to-cabin» and «carriage-to-cabin» communication line. 10 15 20
7. The system as claimed in claim 1 or 2, **characterized in that** the equipment for controlling the high-speed communication line includes a server of video monitoring subsystem controlled from a control desk and a multimedia announcement and associated equipment of a video archive and a video monitoring subsystem, the control processor being connected to the high-speed communication line through the server. 25 30
8. The system as claimed in any of claims 1-3, **characterized in that** the high-speed communication equipment includes a switching unit installed in the high-speed communication line and connected at least to one television monitor and/or one video camera. 35 40
9. The system as claimed in any of claims 1-3, **characterized in that** the voice announcement playback equipment is connected to the amplifying intercommunication device through a loudspeaking announcement line. 45
10. The system as claimed in any of claims 1-3, **characterized in that** the «passenger-to-driver» and «panic button» intercommunication device is connected to the controlled processor and to the amplifying intercommunication device through the "cabin-cabin" and "carriage-cabin" through a communication line. 50
11. The system as claimed in any of claims 1-3, **characterized in that** the controlled power supply unit includes a switching unit controlled by the controlled processor whose output is connected to the power 55

supply circuit of the information system of the train on route and in the «train parking» mode supplied from a backup storage battery, whose output is connected to the switching unit capable of being connected in the «train parking» mode, and an overhead system voltage converter or a generator whose output is connected to the switching unit with a possibility of its connection when the train is on route.

12. The system as claimed in claim 2, **characterized in that** the low-speed communication line equipment of the head carriage of the train includes a controlled processor connected to a controlled power supply unit, a power supply control unit, a loudspeaker announcement control unit, a door condition control and monitoring unit, a unit for monitoring the technical condition of the train subsystems, an interface for communication with the train distributed systems, a fire extinguishing system starting device, at least one intrusion sensor, one fire detector, one internal information display and one external information display, the controlled processor being connected to the «passenger-to-driver» and «panic button» intercommunication device, and the loudspeaker announcement control unit being connected to the amplifying intercommunication device. 10 15 20 25 30
13. The system as claimed in claim 3, **characterized in that** the low-speed communication line equipment of the hook-on carriage of the train includes a controlled processor connected to a controlled power supply unit, a power supply monitoring unit, a door condition control and monitoring unit, a unit for monitoring the technical condition of the train subsystems, an interface for communication with the train distributed systems, a fire extinguishing system starting device, at least one intrusion sensor, one fire detector, one internal information display and one external information display, the controlled processor being connected to the «passenger-to-driver» and «panic button» intercommunication device. 35 40 45
14. The system as claimed in claim 12 or 13, **characterized in that** the fire extinguishing system starting device includes an "AND" circuit connected to the controlled processor whose inverting input is connected to the overhead system voltage converter or to the generator whose output through the «OR» circuit is connected to the fire extinguishing system, and the second input of the «OR» circuit is connected to the fire extinguishing system manual starting device. 50 55

FIG. 1

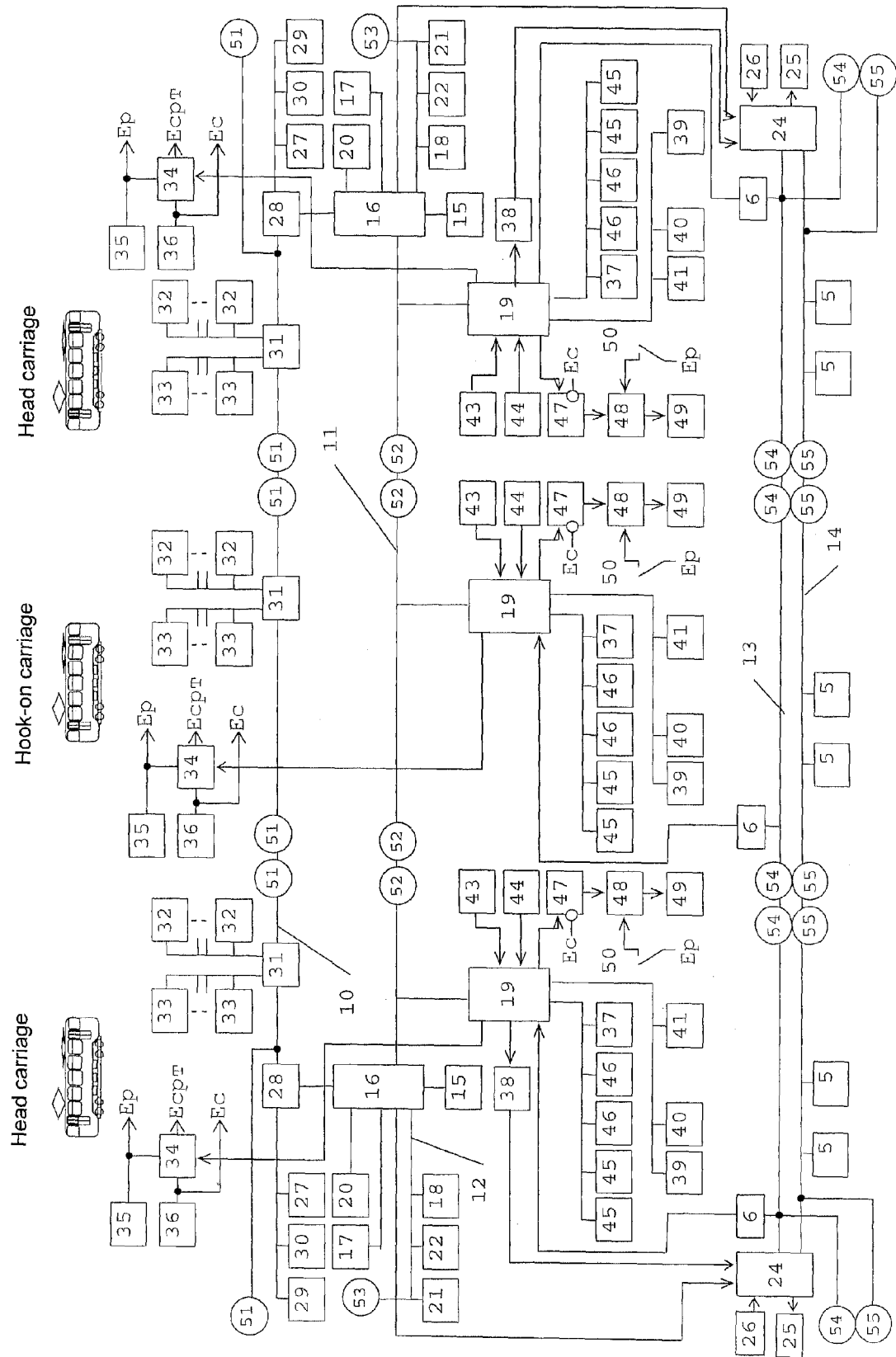


FIG. 2

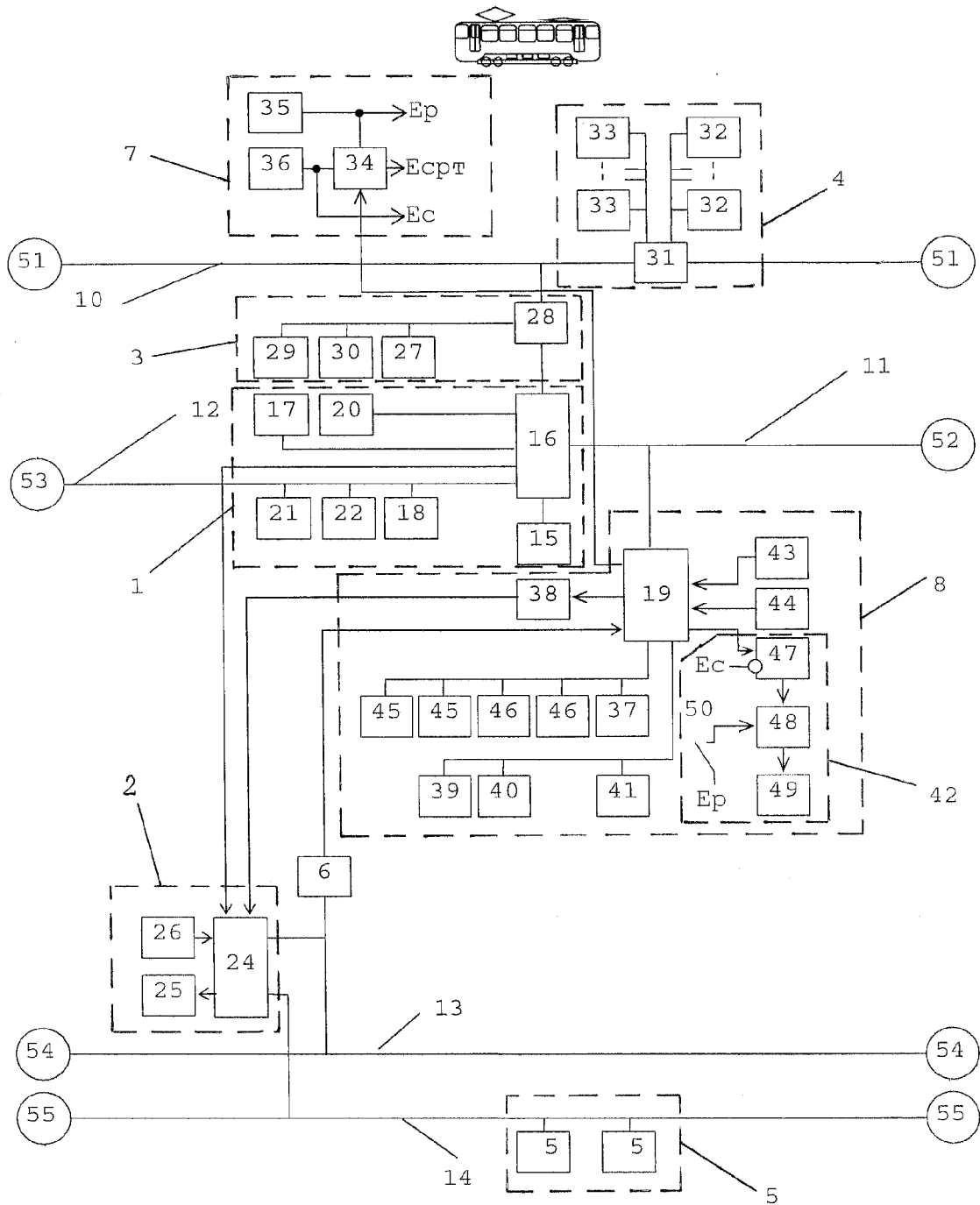


FIG. 3

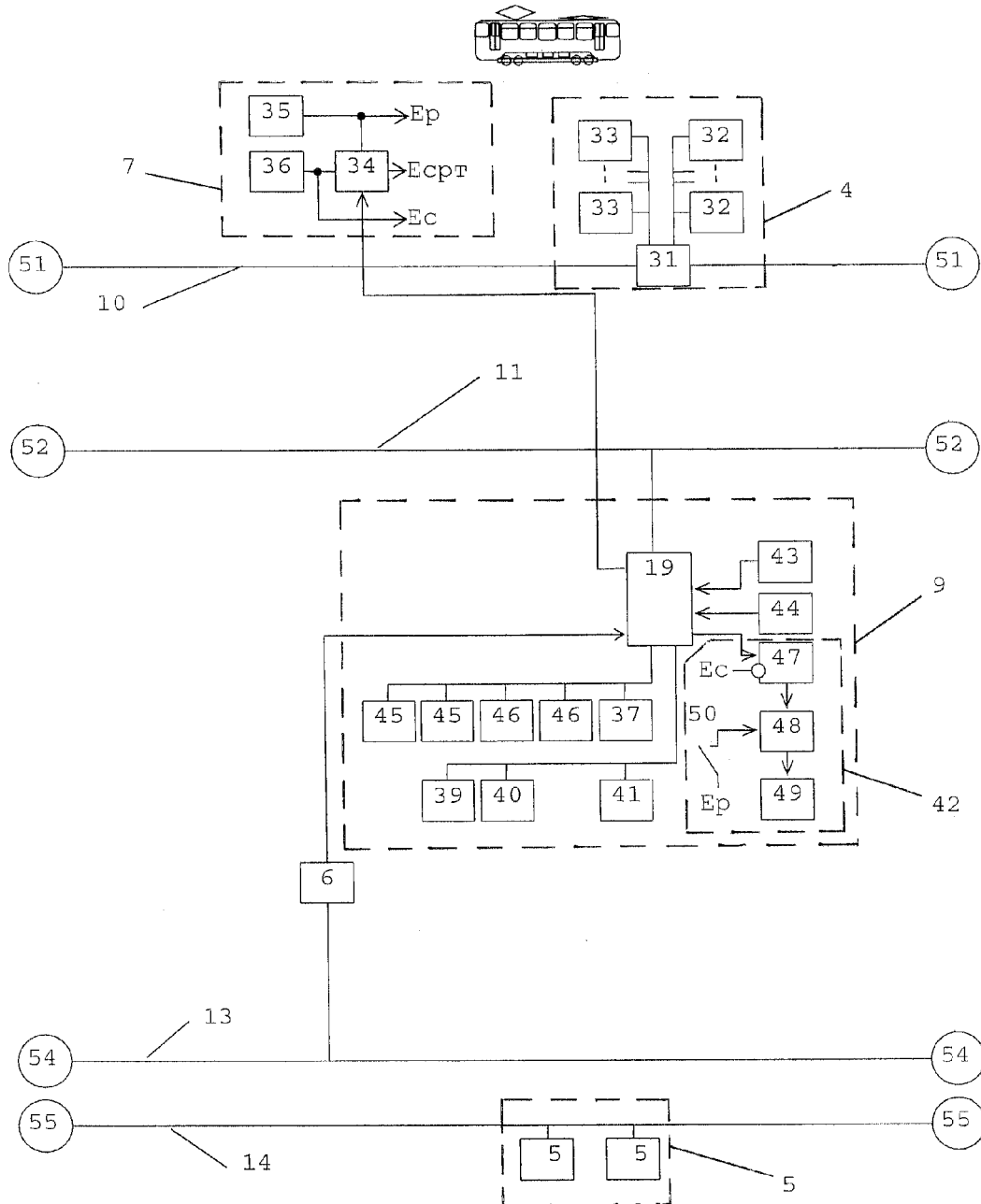
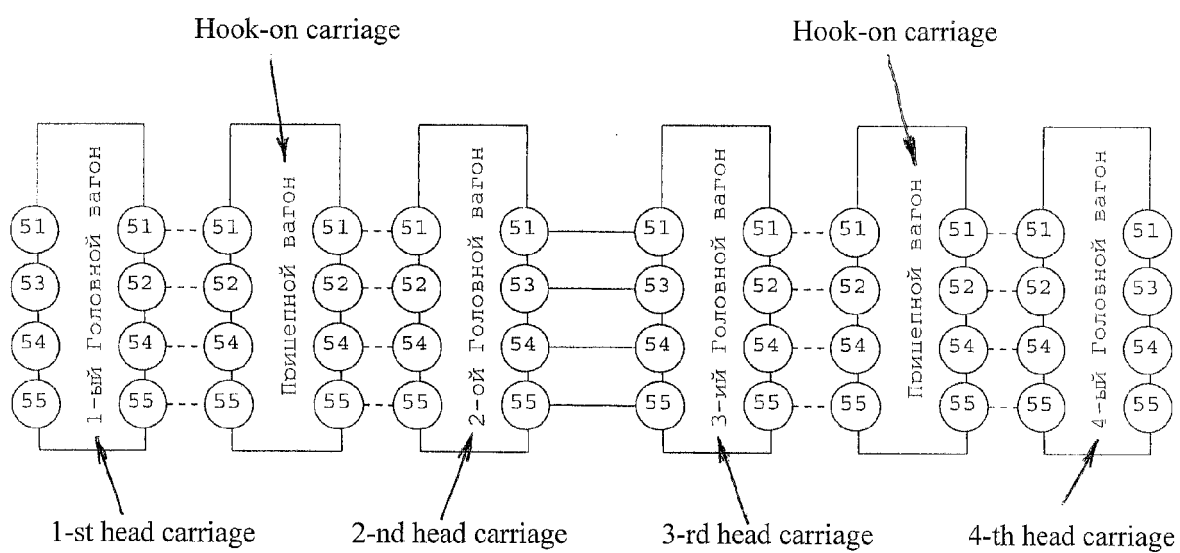


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20100004805 A [0007]