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(54) **TRAIN POSITION DETERMINATION AUXILIARY APPARATUS AND OPERATION METHOD THEREFOR**

HILFSGERÄT ZUR BESTIMMUNG DER ZUGPOSITION UND BETRIEBSVERFAHREN DAFÜR

APPAREIL AUXILIAIRE DE DÉTERMINATION DE POSITION DE TRAIN ET SON PROCÉDÉ DE FONCTIONNEMENT

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Description

FIELD OF TECHNOLOGY

[0001] The present invention belongs to the field of train control, and particularly relates to an auxiliary device for determining a train position and an operation method thereof.

BACKGROUND

[0002] After being powered off, an existing train position determining device cannot detect change of a train position if a train moves. So the device cannot determine the train position after the device is powered on again. Therefore, the train cannot enter a normal operation mode rapidly. The train can enter the normal operation mode only after running at a low speed for a certain distance and receiving trackside information, which causes low operation efficiency. The document CN 109677453 A describes an unmanned sleep train wake-up device and wake-up method.

SUMMARY

[0003] In order to solve the above problem, the present invention provides an auxiliary device for determining a train position according to claim 1 and an operation method thereof according to claim 5, which is capable of quickly determining the train position and enormously improving operation efficiency.

[0004] The present invention provides the auxiliary device for determining a train position according to claim 1, which includes a core processing unit, a speed and distance unit, a trackside information receiving unit and a recording unit,

[0005] wherein the speed and distance unit is configured to measure a speed and a distance of a train; the trackside information receiving unit is configured to receive trackside information; and the core processing unit monitors the train position in real time to determine a power-on condition of the device, calculates, based on the information from a train position determining device, output information of the speed and distance unit and output information of the trackside information receiving unit, whether or not the train moves, a moving direction, a moving distance and whether or not the trackside information is received, and stores a calculation result in the recording unit.

[0006] Furthermore, the auxiliary device for determining a train position and the train position determining device are both installed on the train.

[0007] Furthermore, the auxiliary device for determining a train position and the train position determining device may conduct information interaction in communication modes of IO, a CAN bus, an MVB, a Profibus, and a serial port.

[0008] Furthermore, the auxiliary device for determin-

ing a train position is provided with an independent power switch, and can be constantly in a power-on state.

[0009] The present invention further provides the operation method of the auxiliary device for determining a train position according to claim 5. The method includes the following steps:

1) monitoring, by the auxiliary device for determining a train position, a power-on state of a train position determining device in real time, and switching the auxiliary device for determining a train position into a sleep state if the train position determining device is determined to be in the power-on state;

2) switching the auxiliary device for determining a train position into an operating state if the train position determining device is determined to be in a power-off state, and monitoring a train state in real time when the train position determining device is in the power-off state; and

3) sending, by the auxiliary device for determining a train position, monitoring information when the train is in a power-off state to the train position determining device if the train position determining device is detected to be powered on again, and calculating, by the train position determining device, current train position information according to the received monitoring information sent by the auxiliary device for determining a train position.

[0010] Furthermore, in the step 2), the monitoring information of the auxiliary device for determining a train position includes whether or not the train moves, a moving direction, a moving distance and train position information before the train is powered off.

[0011] Furthermore, in the step 1), the auxiliary device for determining a train position only records information sent by the train position determining device when in the sleep state, but does not monitor an operation state of the train.

[0012] Furthermore, in the step 2), the auxiliary device for determining a train position may also receive trackside information and transmits the trackside information to the train position determining device after the train position determining device is powered on.

[0013] Furthermore, in the step 3), the train position determining device may also detect validity of trackside information transmitted by the auxiliary device for determining a train position and execute a command included in the valid trackside information.

[0014] Furthermore, the command includes a level conversion command and a wireless calling command.

[0015] According to the method and the device of the present invention, the train position determining device calculates train position information after the train is powered on according to whether or not the train moves, the moving direction, the moving distance and the train position information before the train is powered off, which are provided by the auxiliary device, determined train

position information is timely reported to ground equipment by means of onboard equipment, and meanwhile, information such as movement permission is quickly received on the ground, so that a process of redetermining the train position after the train is powered on is omitted, the train position determining device powered on again can quickly determine the train position, the determined train position information is timely reported to the ground equipment by means of the onboard equipment, the train may quickly receive the information such as the movement permission from the ground equipment, a process of redetermining the train position after the train position determining device is powered on is omitted, operating efficiency is greatly improved, then the train timely enters a normal operation mode, and operation efficiency is improved; and in addition, the train position determining device detects the validity of the trackside information according to the received trackside information provided by the auxiliary device and executes the command included in the valid trackside information, such as the level conversion command and the wireless calling command, thereby improving operation safety.

[0016] Other features and advantages of the present invention will be explained in the following specification, part of which will be obvious in the specification, or may be known through implementation of the present invention. The objective and other advantages of the present invention may be realized and obtained by means of the structure pointed out by the specification, the claims and the drawings. The invention is defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] In order to more clearly illustrate technical solutions in the embodiments of the present invention or in the prior art, a brief introduction to the accompanying drawings required for the description of the embodiments or the prior art will be provided below. Obviously, the accompanying drawings in the following description are some of the embodiments of the present invention, and those of ordinary skill in the art would also be able to derive other drawings from these drawings without making creative efforts.

[0018] Fig. 1 shows a position arrangement diagram of a device according to embodiments of the present invention.

DESCRIPTION OF THE EMBODIMENTS

[0019] In order to make objectives, technical solutions and advantages of embodiments of the present invention more obvious, the technical solutions in the embodiments of the present invention will be clearly and completely described below in conjunction with accompanying drawings in the embodiments of the present invention. Obviously, the described embodiments are some, rather than all of the embodiments of the present inven-

tion.

[0020] After being powered off, an existing train position determining device cannot detect change of a train position if a train moves. So the device cannot determine the train position after the device is powered on again. Therefore, the train cannot enter a normal operation mode rapidly. The train can enter the normal operation mode only after running at a low speed for a certain distance and receiving trackside information, which causes low operation efficiency. The present invention designs an auxiliary method and device for determining the train position. After the train position determining device is powered off, the auxiliary device uses a UPS or other power sources for power supply to continuously operate, and whether or not the train moves, a moving distance, etc. are determined by means of a sensor when the train moves. After the train position determining device is powered on, the auxiliary device sends moving information of the train to the train position determining device, so that the train position determining device can quickly determine the train position, and then the train enters the normal operation mode timely, thereby improving the operation efficiency. The sent information includes, but is not limited to, whether or not the train moves, a moving direction, the moving distance, whether or not the trackside information is received, and the trackside information.

[0021] As shown in Fig. 1, the auxiliary device for determining a train position and the train position determining device are both installed on the train, and the auxiliary device for determining a train position and the train position determining device may conduct information interaction in communication modes of IO, a CAN bus, an MVB, a Profibus, a serial port, etc. The auxiliary device for determining a train position is provided with an independent power switch, and can be constantly in a power-on state, that is, after the train position determining device is powered off, the auxiliary device for determining a train position may still be in the power-on state independently.

[0022] The auxiliary device for determining a train position includes a core processing unit, a speed and distance unit, a trackside information receiving unit and a recording unit, wherein the speed and distance unit is configured to measure a speed and a distance of the train; the trackside information receiving unit is configured to receive the trackside information; and the core processing unit calculates, based on information from the train position determining device, output information of the speed and distance unit and output information of the trackside information receiving unit, whether or not the train moves, the moving direction, the moving distance, whether or not the trackside information is received, the trackside information, etc., and stores the calculation results in the recording unit.

[0023] Specifically, the speed and distance unit, the trackside information receiving unit and the recording unit are all connected to the core processing unit, and the

speed and distance unit, the trackside information receiving unit and the recording unit independently exist without any connection among them.

[0024] Specifically, the train position determining device provides initial state information for the core processing unit, which includes train position information after stop, etc.

[0025] Specifically, after entering an operating state, the auxiliary device calculates, based on the initial state information, information such as the train position and a direction in real time according to the output information of the speed and distance unit and the output information of the trackside information receiving unit; and after the train position determining device enters the operating state, the auxiliary device reports whether or not the train moves, the moving direction, the moving distance, whether or not the trackside information is received, the trackside information, etc. to the train position determining device, and the train position determining device calculates train position information after the train is powered on according to information provided by the auxiliary device, checks validity of the trackside information provided by the auxiliary device and executes a command included in the valid trackside information.

[0026] When the train position determining device is in the power-on state, the auxiliary device for determining a train position only records the information sent by the train position determining device when in a sleep state, but does not monitor an operation state of the train.

[0027] When the train position determining device is in a power-off state, the auxiliary device for determining a train position enters the operating state, and the train position determining device sends the initial state information of the train, such as the train position information after the stop, to the core processing unit; and the core processing unit calculates, based on an initial state of the train, whether or not the train moves, the moving direction, the moving distance, whether or not the trackside information is received, the trackside information, etc. in real time according to the output information of the speed and distance unit and the output information of the trackside information receiving unit, and stores the results in the recording unit.

[0028] After the train position determining device is detected to be powered on, the auxiliary device for determining a train position sends monitoring information when the train is in the power-off state to the train position determining device, which includes whether or not the train moves, the moving direction, the moving distance, whether or not the trackside information is received, etc.

[0029] The train position determining device calculates the train position information after the train is powered on according to whether or not the train moves, the moving direction, the moving distance and train position information before the train is powered off, and the information such as whether or not the train moves, the moving direction, the moving distance and train position information before the train is powered off, are provided by the

auxiliary device for determining a train position, detects the validity of the trackside information provided by the auxiliary device for determining a train position and executes the command included in the valid trackside information, such as a level conversion command and a wireless calling command, thereby improving operating efficiency. Meanwhile, onboard equipment reports the determined train position information to ground equipment, so that information such as movement permission may be quickly received on the ground, thereby omitting a process of redetermining the train position after the train is powered on, and improving the operating efficiency.

[0030] According to the method and the device of the present invention, the train position determining device calculates train position information after the train is powered on according to whether or not the train moves, the moving direction, the moving distance and the train position information before the train is powered off, which are provided by the auxiliary device, determined train position information is timely reported to ground equipment by means of onboard equipment, and meanwhile, information such as movement permission is quickly received on the ground, so that a process of redetermining the train position after the train is powered on is omitted, the train position determining device powered on again can quickly determine the train position, the determined train position information is timely reported to the ground equipment by means of the onboard equipment, the train may quickly receive the information such as the movement permission from the ground equipment, a process of redetermining the train position after the train position determining device is powered on is omitted, operating efficiency is greatly improved, then the train timely enters a normal operation mode, and operation efficiency is improved; and in addition, the train position determining device detects the validity of the trackside information according to the received trackside information provided by the auxiliary device and executes the command included in the valid trackside information, such as the level conversion command and the wireless calling command, thereby improving operation safety.

[0031] Although the present invention is described in detail with reference to the above-mentioned embodiments, those of ordinary skill in the art should understand that they may still make modifications to the technical solutions described in the above-mentioned embodiments or equivalent replacements to part of technical features therein.

Claims

1. An auxiliary device for determining a train position, wherein the auxiliary device comprises a core processing unit, a speed and distance unit, a trackside information receiving unit and a recording unit, wherein

the speed and distance unit is configured to measure a speed and a distance of a train; the trackside information receiving unit is configured to receive trackside information; and the core processing unit monitors a power-on condition of a train position determining device in real time, and,

if the train position determining device is determined to be in the power-on state switches the auxiliary device for determining a train position into a sleep state, or, if the train position determining device is determined to be in a power-off state, switches the auxiliary device for determining a train position into an operating state and continuously monitors a state of the train in real time when the train position determining device is in the power-off state by calculating, based on information from the train position determining device, output information of the speed and distance unit and output information of the trackside information receiving unit, whether or not the train moves, a moving direction, a moving distance and whether or not the trackside information is received, and stores a calculation result in the recording unit.

2. The auxiliary device for determining a train position according to claim 1, **characterized in that** the auxiliary device for determining a train position and the train position determining device are both installed on the train.
3. The auxiliary device for determining a train position according to claim 1, **characterized in that** the auxiliary device for determining a train position and the train position determining device can conduct information interaction in communication modes of IO, a CAN bus, an MVB, a Profibus, and a serial port.
4. The auxiliary device for determining a train position according to claim 1, **characterized in that** the auxiliary device for determining a train position is provided with an independent power switch and can be constantly in a power-on state.
5. An operation method of the auxiliary device for determining a train position according to any of claims 1-4, wherein the method comprises the following steps:

1) monitoring, by the auxiliary device for determining a train position, a power-on state of a train position determining device in real time,

and switching the auxiliary device for determining a train position into a sleep state if the train position determining device is determined to be in the power-on state;

2) switching the auxiliary device for determining a train position into an operating state if the train position determining device is determined to be in a power-off state, and monitoring a train state in real time when the train position determining device is in the power-off state;

and

3) sending, by the auxiliary device for determining a train position, monitoring information when the train is in the power-off state to the train position determining device if the train position determining device is detected to be powered on again, and calculating, by the train position determining device, current train position information based on the received monitoring information sent by the auxiliary device for determining a train position,

wherein

the monitoring information comprises information from the train position determining device, output information of the speed and distance unit and output information of the trackside information receiving unit, and

the calculated current train position information comprises information whether or not the train moves, a moving direction, a moving distance and whether or not the trackside information is received.

6. The operation method according to claim 5, **characterized in that** in the step 2), the monitoring information of the auxiliary device for determining a train position comprises whether or not the train moves, a moving direction, a moving distance and train position information before a train is powered off.
7. The operation method according to claim 5, **characterized in that** in the step 1), the auxiliary device for determining a train position only records information sent by the train position determining device when in the sleep state, but does not monitor an operation state of the train.
8. The operation method according to claim 5, **characterized in that** in the step 2), the auxiliary device for determining a train position can also receive trackside information and transmits the trackside information to the train position determining device after the train position determining device is powered on.

9. The operation method according to claim 5, **characterized in that** in the step 3), the train position determining device can also detect validity of the trackside information transmitted by the auxiliary device for determining a train position and executes a command included in the valid trackside information.

10. The operation method according to claim 9, **characterized in that** the command comprises a level conversion command and a wireless calling command.

Patentansprüche

1. Hilfsvorrichtung zur Bestimmung einer Zugposition, wobei die Hilfsvorrichtung eine Kernverarbeitungseinheit, eine Geschwindigkeits- und Entfernungseinheit, eine streckenseitige Informationsempfangseinheit und eine Aufzeichnungseinheit umfasst, wobei

die Geschwindigkeits- und Entfernungseinheit konfiguriert ist, um eine Geschwindigkeit und eine Entfernung eines Zuges zu messen; die streckenseitige Informationsempfangseinheit konfiguriert ist, um streckenseitige Informationen zu empfangen; und die Kernverarbeitungseinheit einen Einschaltzustand einer Zugpositionsbestimmungsvorrichtung in Echtzeit überwacht, und,

wenn festgestellt wird, dass sich die Zugpositionsbestimmungsvorrichtung im eingeschalteten Zustand befindet, die Hilfsvorrichtung zur Bestimmung der Zugposition in einen Ruhezustand schaltet, oder, wenn festgestellt wird, dass sich die Zugpositionsbestimmungsvorrichtung in einem ausgeschalteten Zustand befindet, die Hilfsvorrichtung zum Bestimmen einer Zugposition in einen Betriebszustand schaltet und kontinuierlich einen Zustand des Zuges in Echtzeit überwacht, wenn sich die Zugpositionsbestimmungsvorrichtung in dem ausgeschalteten Zustand befindet, indem sie berechnet: auf der Grundlage von Informationen von der Zugpositionsbestimmungsvorrichtung, von Ausgabeinformationen der Geschwindigkeits- und Entfernungseinheit und von Ausgabeinformationen der Einheit zum Empfangen von streckenseitigen Informationen, ob sich der Zug bewegt oder nicht, einer Bewegungsrichtung, einer Bewegungsentfernung und ob die Streckeninformationen empfangen werden oder nicht, und ein Berechnungsergeb-

nis in der Aufzeichnungseinheit speichert.

2. Hilfsvorrichtung zur Bestimmung einer Zugposition nach Anspruch 1, **dadurch gekennzeichnet, dass** die Hilfsvorrichtung zur Bestimmung einer Zugposition und die Zugpositionsbestimmungsvorrichtung beide im Zug installiert sind.

3. Hilfsvorrichtung zur Bestimmung einer Zugposition nach Anspruch 1, **dadurch gekennzeichnet, dass** die Hilfsvorrichtung zur Bestimmung einer Zugposition und die Zugpositionsbestimmungsvorrichtung Informationsinteraktion in Kommunikationsmodi von IO, einem CAN-Bus, einem MVB, einem Profibus und einer seriellen Schnittstelle ausführen kann.

4. Hilfsvorrichtung zur Bestimmung einer Zugposition nach Anspruch 1, **dadurch gekennzeichnet, dass** die Hilfsvorrichtung zur Bestimmung einer Zugposition mit einem unabhängigen Netzschalter vorgesehen ist und sich ständig im eingeschalteten Zustand befinden kann.

5. Betriebsverfahren der Hilfsvorrichtung zur Bestimmung einer Zugposition gemäß nach einem der Ansprüche 1-4, wobei das Verfahren die folgenden Schritte umfasst:

1) Überwachen eines Einschaltzustandes durch die Hilfsvorrichtung zur Bestimmung einer Zugposition, einer Zugpositionsbestimmungsvorrichtung in Echtzeit und Schalten der Hilfsvorrichtung zur Bestimmung einer Zugposition in einen Schlafzustand, wenn die Zugpositionsbestimmungsvorrichtung den Einschaltzustand feststellt;

2) Schalten der Hilfsvorrichtung zur Bestimmung einer Zugposition in einen Betriebszustand, wenn die Zugpositionsbestimmungsvorrichtung als in einem ausgeschalteten Zustand befindlich bestimmt wird, und Überwachen eines Zugzustands in Echtzeit, wenn sich die Zugpositionsbestimmungsvorrichtung in dem ausgeschalteten Zustand befindet; und

3) Senden von Überwachungsinformationen durch die Hilfsvorrichtung zur Bestimmung einer Zugposition, wenn sich der Zug im ausgeschalteten Zustand befindet, an die Zugpositionsbestimmungsvorrichtung, wenn festgestellt wird, dass die Zugpositionsbestimmungsvorrichtung wieder eingeschaltet ist, und Berechnen, durch die Zugpositionsbestimmungsvorrichtung, aktueller Zugpositionsinformationen auf der Grundlage der empfangenen Überwachungsinformationen, die von der Hilfsvorrichtung zur

Bestimmung einer Zugposition gesendet werden,

wobei

die Überwachungsinformationen Informationen von der Zugpositionsbestimmungsvorrichtung, Ausgabeinformationen der Geschwindigkeits- und Entfernungseinheit und Ausgabeinformationen der streckenseitigen Informationsempfangseinheit umfassen, und die berechnete aktuelle Zugpositionsinformationen Informationen darüber enthalten, ob der Zug fährt oder nicht, eine Bewegungsrichtung, eine Fahrtstrecke und ob die streckenseitigen Informationen empfangen werden oder nicht.

6. Betriebsverfahren nach Anspruch 5, **dadurch gekennzeichnet, dass** in Schritt 2) die Überwachungsinformationen der Hilfsvorrichtung zur Bestimmung einer Zugposition umfassen ob der Zug fährt oder nicht, eine Bewegungsrichtung, eine Bewegungsstrecke und eine Zugpositionsinformation, bevor ein Zug abgeschaltet wird.
7. Betriebsverfahren nach Anspruch 5, **dadurch gekennzeichnet, dass** im Schritt 1) die Hilfsvorrichtung zur Bestimmung einer Zugposition nur die von der Zugpositionsbestimmungsvorrichtung im Ruhezustand gesendeten Informationen aufzeichnet, aber keinen Betriebszustand des Zuges überwacht.
8. Betriebsverfahren nach Anspruch 5, **dadurch gekennzeichnet, dass** in Schritt 2) die die Hilfsvorrichtung zur Bestimmung einer Zugposition auch streckenseitige Informationen empfangen kann und die streckenseitigen Informationen an die Zugpositionsbestimmungsvorrichtung überträgt, nachdem die Zugpositionsbestimmungsvorrichtung eingeschaltet ist.
9. Betriebsverfahren nach Anspruch 5, **dadurch gekennzeichnet, dass** in Schritt 3) die Zugpositionsbestimmungsvorrichtung auch die Gültigkeit der streckenseitigen Informationen, die von der Hilfsvorrichtung zur Bestimmung einer Zugposition übertragen werden feststellen kann, und einen Befehl ausführt, der in den gültigen streckenseitigen Informationen enthalten ist.
10. Betriebsverfahren nach Anspruch 9, **dadurch gekennzeichnet, dass** der Befehl einen Befehl zur Levelumwandlung und einen Befehl zum drahtlosen Anrufen umfasst.

Revendications

1. Dispositif auxiliaire permettant de déterminer une position de train, dans lequel le dispositif auxiliaire comprend une unité de traitement centrale, une unité de vitesse et de distance, une unité de réception d'informations côté voie et une unité d'enregistrement,

dans lequel l'unité de vitesse et de distance est configurée pour mesurer une vitesse et une distance d'un train ; l'unité de réception d'informations côté voie est configurée pour recevoir des informations côté voie ; et l'unité de traitement centrale surveille une condition de mise sous tension d'un dispositif de détermination de position de train en temps réel, et,

si le dispositif de détermination de position de train qui est déterminé comme étant dans l'état de mise sous tension commute le dispositif auxiliaire permettant de déterminer une position de train dans un état de sommeil, ou,

si le dispositif de détermination de position de train qui est déterminé comme étant dans un état hors tension, commute le dispositif auxiliaire permettant de déterminer une position de train dans un état fonctionnel et surveille en continu un état du train en temps réel lorsque le dispositif de détermination de position de train est dans l'état hors tension en calculant, sur la base d'informations provenant du dispositif de détermination de position de train, des informations de sortie de l'unité de vitesse et de distance et des informations de sortie de l'unité de réception d'informations côté voie, selon si le train se déplace ou non, une direction de déplacement, une distance de déplacement et selon si les informations côté voie sont reçues ou non, et stocke un résultat de calcul dans l'unité d'enregistrement.
2. Dispositif auxiliaire permettant de déterminer une position de train selon la revendication 1, **caractérisé en ce que** le dispositif auxiliaire permettant de déterminer une position de train et le dispositif de détermination de position de train sont tous deux installés sur le train.
3. Dispositif auxiliaire permettant de déterminer une position de train selon la revendication 1, **caractérisé en ce que** le dispositif auxiliaire permettant de déterminer une position de train et le dispositif de détermination de position de train peuvent mener une interaction d'informations dans des modes de communication d'IO, un bus CAN, un MVB, un Profibus, et un port série.

4. Dispositif auxiliaire permettant de déterminer une position de train selon la revendication 1, **caractérisé en ce que** le dispositif auxiliaire permettant de déterminer une position de train est doté d'un commutateur de puissance indépendant et peut être constamment dans un état sous tension. 5
5. Méthode de fonctionnement du dispositif auxiliaire permettant de déterminer une position de train selon l'une quelconque des revendications 1-4, dans laquelle la méthode comprend les étapes suivantes : 10
 - 1) la surveillance, par le dispositif auxiliaire permettant de déterminer une position de train, d'un état sous tension d'un dispositif de détermination de position de train en temps réel, et la commutation du dispositif auxiliaire permettant de déterminer une position de train dans un état de sommeil si le dispositif de détermination de position de train est déterminé comme étant dans l'état sous tension ; 20
 - 2) la commutation du dispositif auxiliaire permettant de déterminer une position de train dans un état fonctionnel si le dispositif de détermination de position de train est déterminé comme étant dans un état hors tension, et la surveillance d'un état de train en temps réel lorsque le dispositif de détermination de position de train est dans l'état hors tension ; et 25
 - 3) l'envoi, par le dispositif auxiliaire permettant de déterminer une position de train, d'informations de surveillance lorsque le train est dans l'état hors tension au dispositif de détermination de position de train si le dispositif de détermination de position de train est détecté comme étant encore sous tension, et le calcul, par le dispositif de détermination de position de train, d'informations de position de train actuelle sur la base des informations de surveillance reçues envoyées par le dispositif auxiliaire permettant de déterminer une position de train, dans laquelle 30
 - les informations de surveillance comprennent des informations provenant du dispositif de détermination de position de train, des informations de sortie de l'unité de vitesse et de distance et des informations de sortie de l'unité de réception d'informations côté voie, et 35
 - les informations de position de train actuelle calculées comprennent des informations portant sur le déplacement ou non du train, une direction de déplacement, une distance de déplacement et la réception ou non des informations côté voie. 40
6. Méthode de fonctionnement selon la revendication 5, **caractérisée en ce que** dans l'étape 2), les informations de surveillance du dispositif auxiliaire permettant de déterminer une position de train 45
 - comprennent le déplacement ou non du train, une direction de déplacement, une distance de déplacement et des informations de position de train avant qu'un train ne soit mis hors tension. 50
7. Méthode de fonctionnement selon la revendication 5, **caractérisée en ce que** dans l'étape 1), le dispositif auxiliaire permettant de déterminer une position de train enregistre uniquement des informations envoyées par le dispositif de détermination de position de train lorsqu'il est dans l'état de sommeil, mais ne surveille pas un état de fonctionnement du train. 55
8. Méthode de fonctionnement selon la revendication 5, **caractérisée en ce que** dans l'étape 2), le dispositif auxiliaire permettant de déterminer une position de train peut également recevoir des informations côté voie et transmet les informations côté voie au dispositif de détermination de position de train après la mise sous tension du dispositif de détermination de position de train.
9. Méthode de fonctionnement selon la revendication 5, **caractérisée en ce que** dans l'étape 3), le dispositif de détermination de position de train peut également détecter la validité des informations côté voie transmises par le dispositif auxiliaire permettant de déterminer une position de train et exécute une commande incluse dans les informations côté voie valides.
10. Méthode de fonctionnement selon la revendication 9, **caractérisée en ce que** la commande comprend une commande de conversion de niveau et une commande d'appel sans fil.

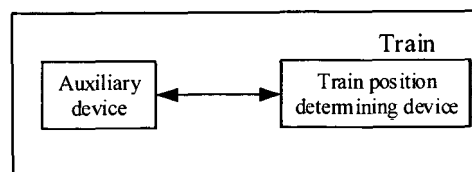


Fig. 1

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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