(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 700 732 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
20.10.1999 Bulletin 1999/42

(51) Int. Cl.[6]: **B07C 3/00**, B07C 3/12

(21) Application number: **95202197.0**

(22) Date of filing: **12.08.1995**

(54) Encoding system for sending trolleys to their destination in a floor chain haulage system

Kodierungssystem, um Laufwagen in einem Kettenverholsystem auf dem Boden nach ihrer Bestimmung zu schicken

Système de codage pour envoyer des chariots vers leur destination dans un système de halage au sol à chaine

(84) Designated Contracting States:
AT CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(30) Priority: **06.09.1994 BE 9400795**

(43) Date of publication of application:
13.03.1996 Bulletin 1996/11

(73) Proprietor:
Elektriciteit voor Goederenbehandeling Marine en Industrie, in het verkort EGEMIN, naamloze vennootschap
B-2900 Schoten (BE)

(72) Inventor:
Vanhoutte, Rudi Marcel Anna
B-2960 Brecht (BE)

(74) Representative: **Donné, Eddy**
Bureau M.F.J. Bockstael nv
Arenbergstraat 13
2000 Antwerpen (BE)

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EP 0 700 732 B1

Description

[0001] The invention concerns an encoding system for sending trolleys to their destination in a floor chain haulage system in which trolleys are moved by means of chains which are worked into metal chain rails in the floor, whereby the encoding system contains transponders mounted on the trolleys which can emit a code and, at least in one place along the floor chain path for the trolleys, code reading means which contain a spool mounted in the floor.

[0002] The code reading means are for example erected before a bifurcation of the floor chain path and are connected to a control device which determines the path to be followed by the trolleys and for example controls the position of a switch on the bifurcation.

[0003] Such encoding systems are used in the place of mechanical systems which contain magnetic pins which are adjustable in height and which are mounted on the trolleys. Sensors which are situated in the floor can detect the position of these magnetic pins. From this position can then be derived the destination. However, the number of codes is limited and the construction is expensive and voluminous.

[0004] In known encoding systems of the mentioned type, the code reading means consist of one spool worked into the floor. The transponder works electromagnetically with a frequency of 100 kHz or more. Due to the presence of a large amount of metal of the trolley, the transponder can only work over a small distance, and the spool must be situated right underneath the transponder during the identification of the code. Consequently, the application in floor chain haulage systems is difficult. Because the spool is situated right or left to the chain rail, also the transponder must be mounted right or left on the trolley. As a result, one must reckon with the tracking of the trolley, for example in or behind a bend.

[0005] The invention aims to remedy these disadvantages and to provide an encoding system for sending trolleys in a floor chain haulage system to their destinations, with which the code of the destination of a trolley can be set in a simple manner, the code of the transponders can be clearly read by the code reading means and no tracking problems occur.

[0006] This aim is reached according to the invention as the code reading means, on the above-mentioned place along the floor chain path, contains two spools which are connected in phase, including one on each side of the chain rail, whereby the metal chain rail functions as a flux conductor, whereby the transponders are of the inductive type with an adjustable code and whereby at least a transmitter and receiver part thereof is mounted above the chain rail.

[0007] The combination of two spools and the chain rail as a flux conductor provides for an increase of the field intensity in the area above the chain rail. Because of this, and thanks to the inductive transponders, it is possible to mount the transponder centrally in relation to the width of the trolley.

Practically, the transponders have an operating frequency which is lower than 100 kHz.

[0008] Preferably, the transponder on a trolley contains a setting part with knobs, and the code of this transponder can be set by means of these knobs.

[0009] The knobs for setting the code allow for a setting without any extra means and allow for a visual recognition of the code and thus of the destination. In the above-mentioned known encoding systems, the used transponders usually have a fixed code, which implies that the spool in fact identifies the trolley and the destination must be found indirectly via a control device. Electronically encodable transponders are known with which a code corresponding to the destination could possibly be emitted, but a special programming device is required to change the code. In both cases, the destination of the trolley is not visually shown to the users.

[0010] In a special embodiment of the invention, the spools are mounted in a bin of flux-conducting metal which is worked into the floor.

[0011] Thanks to the metal bin, the signal intensity above the chain rail is even intensified.

[0012] In order to better explain the characteristics of the invention, the following preferred embodiment of an encoding system for sending trolleys to their destination in a floor chain haulage system is described as an example only, without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 schematically shows a top view of an encoding system according to the invention;

figure 2 shows a section according to line II-II in figure 1;

figure 3 shows the part indicated by F3 in figure 2 in detail.

[0013] The encoding system according to the invention mainly consists, as is represented in the figures 1 and 2, of an inductive transponder 1 on each trolley 2 and of code reading means 3 working in conjunction with it which are mounted in one or several places along the floor chain path 4 before the trolleys in the floor 5.

[0014] The floor chain path 4 is formed in the usual manner of U-shaped chain rails 6 of flux-conducting metal such as steel, which are countersunk in the floor 5 and in which driven chains 7 are provided. A number of links of the chains 7 are catch links. The trolleys 2 contain a pin 8 at the front which reaches into a chain rail 6 and is caught by a catch link, so that, by means of the pin 8, the trolley 2 is taken along by the chain 7. The floor chain path 4 contains bifurcations, so that it reaches several destinations. At each bifurcation is mounted a switch 9 whose position can be changed by a control device 10 as a function of the destination

which an arriving trolley 2 must reach and which is set by means of the transponder 1.

[0015] This transponder 1 contains a transmitter and receiver part 11 which is connected by means of a cable 12 to the setting part 13 provided with knobs 14.

[0016] The transmitter and receiver part 11 is mounted to the lower front of the trolley, right behind the front wheels 20, some two to twenty centimetres from the floor 5. This transmitter and receiver part 11 contains an electronic circuit mounted on a printed circuit-board which is worked into a disc-shaped synthetic housing.

[0017] The operating frequency of the transponder 1 is lower than 100 kHz and preferably lower than 60 kHz, and is for example 50 kHz. As soon as the transmitter and receiver part 11 receives a signal from the code reading means 3, it transmits a signal in turn, namely a code in digital pulse width modulation.

[0018] This code is determined by the setting part 13 and can be set by means of the knobs 14. The knobs are preferably turning knobs. They are situated at the front side of a case in which the setting part 13 is situated, so that the position of the knobs 14 is clearly visible to the user. Thanks to this position, the set code can be visually recognized from a distance. A code is determined by the position of all knobs 14 together, so that the number of possible code combinations depends on the number of possible positions per knob and the number of knobs. With two knobs 14 and six positions can be realized 36 different codes corresponding to 36 destinations.

[0019] The code reading means 3 are formed of two synthetic plates 15 which each contain a spool 16. The spools 16 are connected by means of a cable 17 to the electronics 18 required to transmit the above-mentioned signal to the transponders 1 and to receive the response signals or codes from the transponders 1 via the control devices 10 or a central control which is connected to these control devices 10. The two spools 16 are connected in phase.

[0020] In order to increase the magnetic field intensity above the chain rail 6, the synthetic plates 15 are not mounted directly in the floor 5, but they form a lid of a metal bin 19 which is worked into the floor, as is represented in detail in figure 3.

[0021] The encoding system works as follows.

[0022] By means of the knobs 14, the user sets the code corresponding to a specific destination for each trolley 2. When the trolley 2 approaches a switch 9, it comes in the proximity of code reading means 3 which continuously or intermittently transmit a signal. When the trolley 2 is close enough, the transmitter and receiver part 11 of the transponder 1 mounted upon it receives a signal from the spools 16, so that, as a answer, this transmitter and receiver part 11 will transmit the set code inductively in the form of a modulated signal. This code is read by the code reading means 3 at a speed of for example 70 ms per code and sent to the control device 10 which will either or not change the position of the switch 9.

[0023] The same happens for each subsequent switch 9, so that the trolley 2 is automatically guided to its destination.

[0024] It is thanks to the selection of the low operation frequency of the transponder 1 and the use of two spools 16 connected in phase in the floor 5 that it becomes possible to place the transmitter and receiver part centrally behind the wheels 20, so that the encoding system is not hindered by any tracking problems. The combination of two spools 16 with the flux-conducting metal chain rail 6 results in a greater field intensity above the chain rail 6, which further increases as the spools 16 are mounted in a flux-conducting metal bin 19.

[0025] The present invention is by no means limited to the above-described embodiment represented in the figures; on the contrary, such an encoding system can be made in all sorts of variants while still remaining within the scope of the invention as described in the claims.

Claims

1. Encoding system for sending trolleys (2) to their destination in a floor chain haulage system in which trolleys (2) are moved by means of chains (7) which are worked into metal chain rails (6) in the floor (5), whereby the encoding system contains transponders (1) mounted on the trolleys (2) which can emit a code and, at least in one place along the floor chain path (4) for the trolleys (2), code reading means (3) which contain a spool (16) mounted in the floor (5), characterized in that the code reading means (3), on the above-mentioned place along the floor path (4), contains two spools (15) which are connected in phase, including one on each side of the chain rail (6), whereby the metal chain rail (6) functions as a flux conductor, whereby the transponders (1) are of the inductive type with an adjustable code and whereby at least a transmitter and receiver part (11) thereof is mounted above the chain rail (6).

2. Encoding system according to the preceding claim, characterized in that the inductive transponders (1) have an operating frequency lower than 100 kHz.

3. Encoding system according to the preceding claim, characterized in that the transponder (1) contains a setting part (13) on a trolley (2) with knobs (14) and in that the code of this transponder (1) can be set by means of these knobs (14).

4. Encoding system according to the preceding claim, characterized in that the knobs (14) are turning knobs.

5. Encoding system according to any of the preceding claims, characterized in that the transmitter and receiver part (11) of the transponder (1) is mounted at the bottom of a trolley (2), as seen from the direction of movement, right behind the front wheels (20), and is mounted centrally as seen in the width.

6. Encoding system according to claims 2 and 4, characterized in that the setting part (13) of a transponder (1) is mounted at the front of the trolley (2), with the knobs (14) to the front, and is connected to the transmitter and receiver part (11) by means of a cable (12).

7. Encoding system according to any of the preceding claims, characterized in that the spools (15) are mounted in a bin (19) of flux-conducting metal, which is worked into the floor (2).

8. Encoding system according to any of the preceding claims, characterized in that the operating frequency of the transponder (1) is lower than 60 kHz.

9. Encoding system according to any of the preceding claims, characterized in that the spools (16) are embedded in a synthetic plate (15).

Patentansprüche

1. Kodierungssystem, um Laufwagen (2) in einem Flurkettenfördersystem zu ihrer Bestimmung zu schicken, worin Laufwagen (2) mittels Ketten (7), die in Kettengleise (6) aus Metall im Fußboden (5) eingearbeitet sind, bewegt werden, wobei das Kodierungssystem auf den Laufwagen (2) montierte Transponder (1), die einen Kode aussenden können und, zumindest an einer Stelle entlang der Flurkettenstrecke (4) für die Laufwagen (2), Kodelesmittel (3) umfaßt, die eine im Fußboden (5) montierte Spule (16) besitzen, dadurch gekennzeichnet, daß die Kodelesmittel (3), an der oben erwähnten Stelle entlang der Flurstrecke (4), zwei Spulen (15) umfaßt, die phasenverbunden sind, einschließlich einer an jeder Seite des Kettengleises (6), wobei das Kettengleis (6) aus Metall als Fluxleiter fungiert, wobei die Transponder (1) vom induktiven Typ mit einem einstellbaren Kode sind und wobei zumindest ein Sende- und Empfangsteil (11) davon über dem Kettengleis (6) montiert ist.

2. Kodierungssystem gemäß dem vorangehenden Anspruch, dadurch gekennzeichnet, daß die induktiven Transponder (1) eine Arbeitsfrequenz von weniger als 100 kHz haben.

3. Kodierungssystem gemäß dem vorangehenden Anspruch, dadurch gekennzeichnet, daß der Transponder (1) ein Einstellteil (13) mit Knöpfen (14) an einem Laufwagen (2) umfaßt und daß der Kode dieses Transponders (1) mittels dieser Knöpfe (14) eingestellt werden kann.

4. Kodierungssystem gemäß dem vorangehenden Anspruch, dadurch gekennzeichnet, daß die Knöpfe (14) Drehknöpfe sind.

5. Kodierungssystem gemäß einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß das Sende- und Empfangsteil (11) des Transponders (1) am Boden eines Laufwagens (2) montiert ist, aus der Bewegungsrichtung gesehen, direkt hinter den Vorderrädern (20), und, von der Breite her gesehen, zentral montiert ist.

6. Kodierungsssystem gemäß den Ansprüchen 2 und 4, dadurch gekennzeichnet, daß das Einstellteil (13) eines Transponders (1) an der Vorderseite des Laufwagens (2) montiert ist, mit den Knöpfen (14) nach vorn, und mittels eines Kabels (12) mit dem Sende- und Empfangsteil (11) verbunden ist.

7. Kodierungssystem gemäß einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Spulen (15) in einem Verschlag (19) aus fluxleitendem Metall, der in den Fußboden (2) eingearbeitet ist, montiert sind.

8. Kodierungssystem gemäß einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Arbeitsfrequenz des Transponders (1) niedriger als 60 kHz ist.

9. Kodierungssystem gemäß einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die Spulen (16) in eine synthetische Platte (15) eingebettet sind.

Revendications

1. Système de codage pour envoyer des chariots (2) vers leur destination dans un système de halage au sol à chaîne dans lequel des chariots (2) sont déplacés au moyen de chaînes (7) qui sont ménagées dans des rails de chaîne métalliques (6) dans le sol (5), étant entendu que le système de codage contient des répéteurs (1) montés sur les chariots (2) qui peuvent émettre un code et, au moins à un endroit le long du trajet au sol de chaîne (4) pour les chariots (2), des moyens de lecture de code (3) qui contiennent une bobine (16) montée dans le sol (5), caractérisé en ce que les moyens de lecture de code (3), à l'endroit susmentionné le long du trajet au sol (4), contiennent deux bobines (15) qui sont connectées en phase, incluant une de chaque côté du rail de chaîne (6), étant entendu que le rail de chaîne métallique (6) fonctionne comme un con-

ducteur de flux, étant entendu que les répéteurs (1) sont du type à induction avec un code réglable, et étant entendu qu'au moins une partie émetteur/récepteur (11) de ceux-ci est montée au-dessous du rail de chaîne (6).

2. Système de codage suivant la revendication précédente, caractérisé en ce que les répéteurs inductifs (1) présentent une fréquence de travail qui est inférieure à 100 kHz.

3. Système de codage suivant la revendication précédente, caractérisé en ce que le répéteur (1) contient une partie d'attribution (13) sur un chariot (2) comportant des boutons (14), et en ce que le code de ce répéteur (1) peut être attribué au moyen de ces boutons (14).

4. Système de codage suivant la revendication précédente, caractérisé en ce que les boutons (14) sont des boutons rotatifs.

5. Système de codage suivant l'une quelconque des revendications précédentes, caractérisé en ce que la partie émetteur/récepteur (11) du répéteur (1) est montée au fond d'un chariot (2) comme vu de la direction de déplacement, immédiatement derrière les roues avant (20), et est montée de manière centrale vu de la largeur.

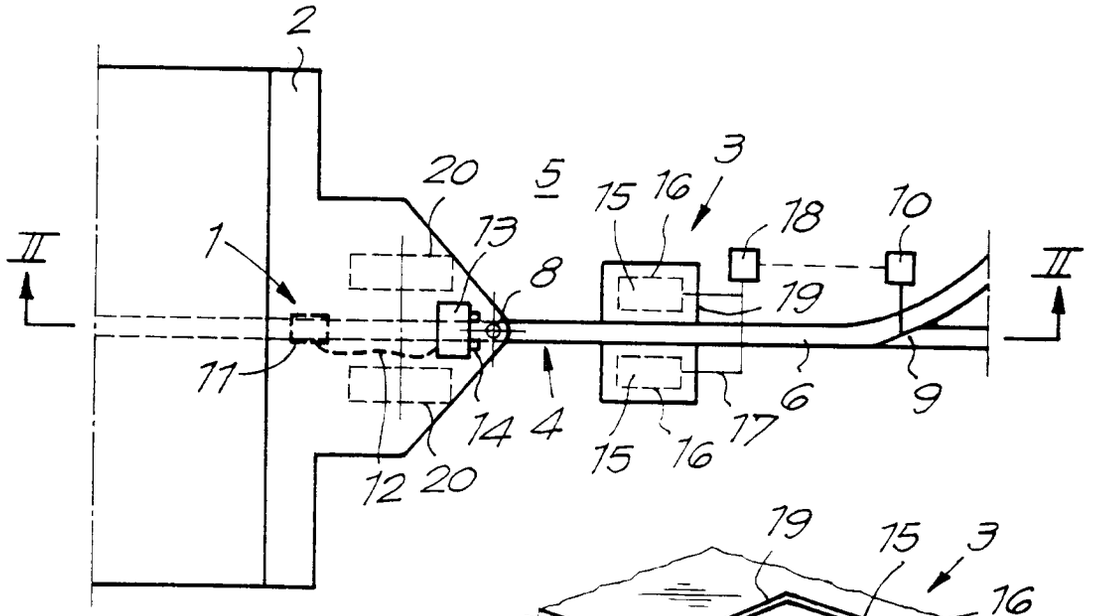
6. Système de codage suivant les revendications 2 et 4, caractérisé en ce que la partie d'attribution (13) d'un répéteur (1) est montée sur le devant du chariot (2), les boutons (14) à l'avant, et est connectée à la partie émetteur/récepteur (11) au moyen d'un câble (12).

7. Système de codage suivant l'une quelconque des revendications précédentes, caractérisé en ce que les bobines (15) sont montées dans une trémie (19) en métal conducteur de flux, qui est ménagée dans le sol (2).

8. Système de codage suivant l'une quelconque des revendications précédentes, caractérisé en ce que la fréquence de travail du répéteur (1) est inférieure à 60 kHz.

9. Système de codage suivant l'une quelconque des revendications précédentes, caractérisé en ce que les bobines (16) sont intégrées dans une plaque synthétique (15).

Fig.1



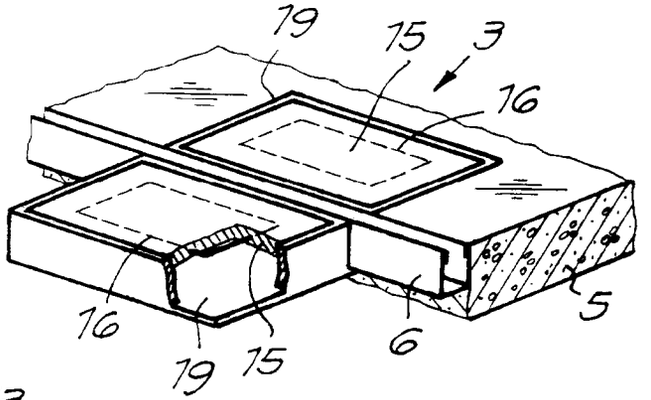


Fig.3

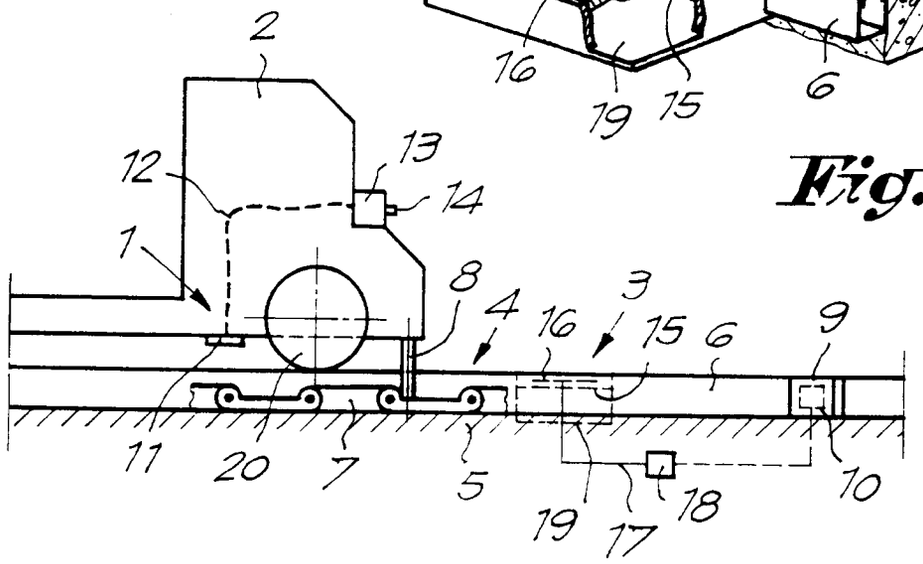


Fig.2