Description

Monitoring device for current collectors

Facilities on vehicles for transmitting electrical energy from a permanently installed current-conducting line to the electrical devices of the vehicle are referred to as current collectors.

Current collectors are predominantly employed in electrically driven rail vehicles as well as trolley busses, in funicular railways to supply power to the lighting and the heating, as well as in bumper cars and overhead line ferries.

Depending on the area of application, different forms of construction have evolved. These are especially dependent on the design of line system of the system concerned, i.e. whether the contact lines are embodied for example as overhead lines, as mostly in railways, streetcars or metro railways, or as power rails disposed laterally, as preferred for subways.

With overhead lines scissor-type current collectors, known as pantographs, are used. They can be employed for both directions of travel and also guarantee, even at high speeds, a continuous contact between contact cable and current collector.

With high-speed trains however scissor-type current collectors are approaching the limits of their reliability. For these trains so-called half-scissor and single-arm pantographs with better aerodynamic properties as well as lower air resistance are used.

For subways and metro railways with power rails arranged to the side next to the track there are current collector shoes of a simpler design, which are guided along so as to slide on top of, to the side of or underneath the power rail.

What all types of current collectors have in common is that they are attached to the outer shell of the vehicles and in some cases project significantly beyond said shell.

They are therefore subjected to particular shocks and stresses and to a high risk of damage.

In the event of damage to the current collector there is also the danger that parts fracturing off will lead to further damage to the vehicles and possibly even to injuries to people.

The object of the invention is therefore to monitor current collectors for damage and to give immediate notification of defects and damage.

In accordance with the invention this is achieved by a monitoring device for current collectors, wherein the current collector is fastened to a vehicle and has contact means for electrical contact with a contact line, wherein the mechanical connection between the contact means and the vehicle is established by means of connecting elements, wherein at least one fracture sensor, which is connected to a detector unit, runs along the connecting elements in such a way that, when one of the connecting elements is damaged, the state of the facture sensor is changed in such a way that the damage can be established by means of the detector unit and can be

transmitted to a driver information system which is connected to the detector unit.

With the invention the driver, the operator or the maintenance personnel of a rail vehicle can be immediately notified about a potential unsafe state of the vehicle or about a possible "fault location" on the track.

This is particularly important if parts that have broken off cause a risk of injury for persons or of damage to the infrastructure or to following trains. Thus a high risk of fire can arise for example as a result of a current conductor shoe that has broken off.

It is advantageous for a wire to be provided as a fracture sensor. This wire can be pre-tensioned for example and connected to a mechanical trigger in the detector unit, so that in the event of a fracture, the pre-tensioning at the mechanical trigger in the detector unit falls away and an electrical error signal is created by the trigger, for example by a switching element.

The wire intended as the fracture sensor can however also have a monitoring signal applied to it, which is monitored in the detector unit. For example the wire can be embodied as a closed electrical circuit and can have power applied to it. In the event of a fracture the current flow is interrupted, which in the simplest case can be represented by a control light going out for example.

However an optical waveguide to which a monitoring signal is applied can also be provided as a fracture sensor. The optical waveguide has the advantage that it is potential-free and can

therefore also be connected to current-carrying connecting line elements.

The invention is also advantageously able to be employed in railway tracks with lateral power rails, when the current collector is fastened to a bogie of a rail vehicle.

It is useful for at least one connecting element of the current collector to have an intended break point, which is bridged by the fracture sensor.

The invention is explained in more detail with reference to an exemplary embodiment shown in the figure.

The exemplary embodiment shows a current collector that is attached to the bogie of a metro rail vehicle and establishes an electrical contact with a power rail at the side of a railway track.

To this end the current collector comprises a current collector shoe 1, which, when the vehicle is in motion, is pressed from below onto the power rail and is in constant sliding contact with the power rail with its surface. The slide element is predominantly made of carbon and is designed so that the wear caused by the sliding predominantly affects the slide element of the current collector shoe 1 and the power rail is protected, since replacing the latter is very expensive.

The current collector shoe 1 is connected pivotably via a high-voltage insulator 2, a bearing 7, to the bogie of the rail vehicle. The pressure to press the shoe onto the power rail is exerted by means of springs 6. The power is

transmitted from the power rail via the current collector shoe 1 into the vehicle via a heavy current conductor 8.

In accordance with the invention a high-tensile cable is now tensioned as fracture sensor 8 between the power collector shoe 1 and the detector unit 3, which bridges the high-voltage insulator 2 and the bearing 7. With a fracture of the high-voltage insulator 2, which very probably runs at the intended break point 9, the load on the tensioned cable 5 is released and a mechanical switch of the detector unit 3 connected to the cable is actuated. This triggers an electrical signal at a driver information system (4) connected to the detector unit.

This allows either the driver, or with driverless operation possibly also a train control center or a suitable monitoring and control unit, immediately to initiate suitable measures, such as a braking process for example.

List of reference characters

1	Current collector shoe
2	High-voltage insulator
3	Detector unit
4	Driver information system
5	Fracture sensor
6	Springs
7	Bearing
8	Heavy current conductor
9	Intended break point of the high-voltage insulator

Claims

1. A monitoring device for current collectors, wherein the current collector is fastened to a vehicle and has contact means for electrical contact with a contact line, wherein the mechanical connection between the contact means and the vehicle is established by means of connecting elements, wherein,
   at least one fracture sensor, which is connected to a detector unit, runs along the connecting elements in such a way that, when one of the connecting elements is damaged, the state of the fracture sensor is changed in such a way that the damage can be established by means of detector unit and can be transmitted to a driver information system, which is connected to the detector unit, and
   wherein a high-tensile cable is provided as the fracture sensor.

2. The monitoring device as claimed in claim 1, wherein the current collector is fastened to a bogie of a rail vehicle and has an electrical contact with a power rail to the side of a railway track.

3. The monitoring device as claimed in claim 1, wherein at least one connecting element of the current collector has an intended break point, which is bridged by the fracture sensor.