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(54) **Railway spray device**

Sprühvorrichtung für Gleisstrecken

Dispositif pulvérisateur pour chemin de fer

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Description

Technical Field

[0001] The invention relates to a spray device, used especially as a railway spray device killing unwanted plants within railway lines.

State of the Art

[0002] A number of ways and means have long been known when it comes to killing all the unwanted plants within railway lines.

[0003] The simplest way is to pluck them out by hand or by means of various simple tools. This way is however rather unproductive and the result of this work is not too satisfactory either.

[0004] There are also various machines and industrial methods for removing unwanted plants within railway lines.

[0005] For instance there are devices that pluck the weeds within the railway lines while being towed by a rail vehicle. Patent CS 17117 describes such a device that plucks the weeds growing on railway benches and embankments; it is provided with a plough which is towed along the railway line, grabs weeds by their roots and plucks them out. The plough is attached to the end of the parallel bars owing to which the plough moves on a plane that is perpendicular to the railway lines. The side of the parallel bars that faces the vehicle frame is swivel-mounted so that it is possible to change the position of the parallel bars in relation to the railway lines. The disadvantages are the poor quality of the work being done by the device and the risk that the device could damage the railway infrastructure, and therefore the device is quite unusable these days.

[0006] Mechanical weed removal is also specified in patent application CZ PV 1994-577. It describes a device that removes weeds from roads, squares, parks and other surfaces that are made especially of gravel, sand, crushed stone or similar materials; it consists of a vehicle equipped with one movable part, carrying at least one tool that gets in contact with the ground and that consists of a foot-like part which is equipped with blades on its front and side edges (viewed from the direction in which the vehicle is moving), and the blades touch the soil at least partly. The tool is turned downwards and vibrates crosswise to the direction in which the vehicle moves. The basic part of the tool is of the shape of a board and the blades are edges of this basic part that are turned downwards. This device is not suitable for removal of unwanted plants within the railway lines.

[0007] There are also devices and methods that remove unwanted plants within the railway lines by means of various hot media.

[0008] Patent CZ 282490 describes a device that kills unwanted plants within the carriageway that consists of a vehicle provided with a steam-generating set. The

steam outlet is equipped with steam nozzles which form one nozzle beam crosswise to the direction of the vehicle movement, along the entire width of the carriageway; the nozzle beam is installed under the vehicle chassis by means of a height adjustable carrier. In the direction of the vehicle movement the vehicle also has height-adjustable carriers hinged laterally on the sides, with nozzle beam sections. The carrier and the side carriers are manufactured as downwards-open covers with a bottom and side walls, and the nozzle beam is adjustably attached to the bottom cover in the direction of the vehicle movement and hinged crosswise in the direction of the vehicle movement, and has at least two rows of nozzles turned downwards in various ways in the direction of the vehicle movement. The disadvantage of this device is that it is little productive, because it must move very slowly if the unwanted plants are to be properly removed from within the railway lines. The device is also rather energy intensive. The device may be dangerous for its environment because of the steam high temperature.

[0009] A similar principle to kill the weeds is described in Patent EP1588615. This device transports hot water over the ground, applies the hot liquids onto the surface without pressure; the device looks for weeds and the hot liquid is applied only onto the detected weeds or close to them, the hot liquid is kept at least in one equalisation tank, which is interconnected with a number of dosing holes, and the hot liquid is applied only through the dosing holes which are situated above or close to the detected weeds, the hot liquid from at least one of the equalisation tank keeps circulating along various dosing holes and is supplied by the stop valve controlled along with a dosing hole. The disadvantages of this method are mostly the same as those of the previous device as regards the removal of unwanted plants within the carriageway.

[0010] There are also devices killing unwanted plants within railway lines by making use of chemical substances.

[0011] For instance Patent EP1521885 describes a weeding machine installed on a railway vehicle equipped with a laser camera recognising weeds and interconnected to a control computer which is connected to a meteorological unit. The control computer is connected to a control panel and the panel is connected via an electronic control unit to a spray unit and a dosing unit. The spray unit consists of a water tank, a water pump, a flow meter, a water control valve, a spray frame with axially arranged nozzles, a chemical substance tank, a chemical substance pump and a chemical substance flow meter; all these units are connected to the control computer. The disadvantage is that it cannot be used for industrial railways and dead-end railway lines. The railway vehicle provided with the above specified weeding machine can only move as a train, which comprises all associated disadvantages.

[0012] It is clear from the above specified state of the arts that there is a number of disadvantages associated with the currently used devices; the most striking fact is

that there is no device removing unwanted plants within the railway lines that could quickly weed any railway lines, incl. industrial railways as well as dead-end railway lines.

[0013] The objective of the invention is to put forward a device that will remove unwanted plants within the railway lines that will be simple, and therefore cheap, and that will allow efficient and quick weeding of any railway lines.

Principle of the Intention

[0014] The said disadvantages are considerably removed and the objectives of the invention are embodied in a railway spray device to kill unwanted plants within railway lines, the device comprising a railway motor vehicle, at least one spray tank and at least one spray nozzle, in accordance with the invention whose principle is based on the fact that it contains at least one vegetation detector, which is installed under the central part of the motor vehicle, and which is connected to at least one control unit, which is connected to at least two spray nozzles installed on the end parts of the motor vehicle.

[0015] The advantage of this arrangement is that the railway vehicle is of small dimensions, a simple design and most importantly it may move along the lines while spraying the plants by travelling between train reporting points. For this way of travelling along the railway lines it is not necessary to book the railway lines or cancel the booked railway lines in case the weather is unfavourable. The travels take place during breaks between planned train rides; during these travels it is possible to stop or reverse. The entire device is thus highly mobile while spraying the woods and at the same time it allows easy manoeuvring. Owing to the installations on both end parts of the motor vehicle it is possible to spray selectively both when the vehicle moves forwards and backwards; this increases mobility and ability to spray any section of the railway lines incl. railway stations and ends of dead-end railway lines.

[0016] It is also advisable to install at least one vegetation detector under the central part of the motor vehicle. This is most advantageous as regards operability of the entire device and favourable as regards its total price.

[0017] For reasons of the design, it is also advantageous when at least one spray nozzle is installed in the frame and when at least one vegetation detector is installed within the frame. Due to this installation it is possible to set and lock the position as required; both the nozzle directions and the positions of vegetation detectors.

[0018] It is also advantageous that at least one control unit and at least one spray nozzle are connected to at least one mixer connected to at least one water tank. This design allows the use of chemical concentrates for spraying, which in addition to the reduced price for spraying also allows the use of smaller tanks and thus also smaller vehicles, and thus the price for the entire spray device is considerably lower. When the spraying is over,

there is no unused herbicide mixed in water that would lose in value, should the work be interrupted for a longer period of time.

[0019] The spray device, as the invention specifies, allows selective spraying both when the vehicle is moving forwards or backwards. Thus you can weed any railway lines without running into any problems, incl. industrial railway lines and dead-end railway lines. According to the invention the spray device is suitable for small railway station where weeds and other unwanted plants cause the biggest problems, and the greatest problem is how to cope with them efficiently. The universal motor vehicle equipped with the spray device may travel as fast as 40 km/hour. It is advisable that this universal motor vehicle should be a railway vehicle equipped with its own diesel engine with a four-wheel drive, which is usually used as a vehicle transporting materials and other means.

[0020] The known devices are usually installed on train sets. A great advantage of the spray device, as specified by the invention, is the fact that it may be installed on a universal motor vehicle. This universal motor vehicle is of small dimensions, simple design and most importantly it may move along the lines while spraying the plants by travelling between train reporting points. Train sets with spray devices are difficult to use within the railway transport system and must travel as any other train sets, they cannot stop and go backwards.

Overview of the Figures

[0021] The invention will be explained in greater detail by means of the drawings where fig. 1 shows the side elevation of the spray device and fig. 2 shows the front elevation of the spray device.

Example of the Performance of the Invention

[0022] The railway spray device to kill unwanted plants within railway lines (Fig. 1, Fig. 2) involves the railway motor vehicle 1, the spray tank 2, two sections of spray nozzles 3, one section of vegetation detectors 4 connected to the control unit 7.

[0023] Both the sections of the spray nozzles 3 are installed in frames 9 which are arranged on both end parts 5, 6 of the frame of the motor vehicle 1.

[0024] The section of vegetation detectors 4 is installed within frame 10, under the central part 8 of the frame of the motor vehicle 1.

[0025] The control unit 7 and the spray nozzles 3 are connected to the mixer 11 connected to the water tank 12.

[0026] The control unit 7 is remotely connected to the control centre.

[0027] The railway spray device works so that the detector 4, processing the light ray reflected from the railway base, monitors the surface of the railway superstructure. If a plant appears in the field of view of the detector 4, the detector 4 passes the information to the control unit 7 that will give an impulse to the mixer 11 that will deliver

a properly mixed chemical substance to the spray nozzle 3 hovering over the plant and this spray nozzle 3 will apply the mixed chemical substance onto the plant.

Industrial Application

[0028] The spray device can be used according to the invention for the removal of unwanted plants, especially for the removal of unwanted plants within the railway superstructure.

Claims

1. A railway spray device to kill unwanted plants within railway lines, the device comprising a railway motor vehicle (1), at least one spray tank (2), at least one vegetation detector, at least one control unit and at least one spray nozzle (3), **characterised by the fact** that the vegetation detector (4) is installed under the central part (8) of the motor vehicle (1), and is connected to the at least one control unit (7), which is connected to at least two spray nozzles (3) installed on the end parts (5,6) of the motor vehicle (1).
2. The spray device, according to claim 1, **characterised by the fact** that at least one spray nozzle (3) is installed within the frame (9).
3. The spray device, according to one of the previous claims, **characterised by the fact** that at least one vegetation detector (4) is installed within the frame (10).
4. The spray device, according to one of the previous claims, **characterised by the fact** that at least one control unit (7) and at least one spray nozzle (3) are interconnected with at least one mixer (11) connected to at least one water tank (12).
5. The spray device, according to one of the previous claims, **characterised by the fact** that the control unit (7) is remotely connected to the control centre.

Patentansprüche

1. Besprühanlage für die Bekämpfung unnötigen Unkrauts auf den Bahnwegen ist eine Anlage, die einen Schienenkraftwagen (1), mindestens einen Behälter (2) mit dem Sprühmittel, mindestens einen Pflanzendetektor (4), mindestens ein Steuergerät (7), sowie mindestens eine Spritzdüse (3) umfasst, **dadurch gekennzeichnet, dass** sich der Pflanzendetektor (4) unterhalb des Mittelteils (8) des Bahnkraftwagens (1) befindet, und mit mindestens einem Steuergerät (7) verbunden ist, welches mit mindestens zwei an den Endteilen (5,6) des Schienenkraftwa-

gens (1) angebrachten Spritzdüsen (3) verbunden ist.

2. Besprühanlage gemäß dem Anspruch 1, **dadurch gekennzeichnet, dass** sich mindestens eine Spritzdüse (3) im Untergestell (9) befindet.
3. Besprühanlage gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** sich mindestens ein Pflanzendetektor (4) in dem Untergestell befindet (10).
4. Besprühanlage gemäß einem der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** mindestens ein Steuergerät (7) und mindestens eine Spritzdüse (3) mit mindestens einer Mischanlage (11) mit mindestens einem Wasserbehälteranschluss (12) verbunden sind.
5. Besprühanlage gemäß einer der vorherigen Ansprüche, **dadurch gekennzeichnet, dass** das Steuergerät (7) mit dem Steuerzentrum über die Fernbetätigung verbunden ist.

Revendications

1. Le dispositif de pulvérisation pour détruire la végétation indésirable sur les voies ferrées, le dispositif comprenant le chariot à moteur (1), au moins un réservoir (2) avec du liquide à pulvériser, au moins un détecteur (4) des plantes, au moins une unité directrice (7), et au moins une buse de pulvérisation (3), **caractérisé en ce, que** le détecteur (4) des plantes est placé au-dessous la partie (8) centrale du chariot à moteur (1), et il est connecté au moins à une unité directrice (7) qui est connecté au moins à deux buse de pulvérisation (3) placées au parties extrêmes (5, 6) du chariot à moteur (1).
2. Le dispositif de pulvérisation selon la revendication 1, **caractérisé en ce, qu'**au moins une buse de pulvérisation (3) est placée dans le cadre (9).
3. Le dispositif de pulvérisation selon une des revendications précédentes, **caractérisé en ce, qu'**au moins un détecteur (4) des plantes est placé dans le cadre (10).
4. Le dispositif de pulvérisation selon une des revendications précédentes, **caractérisé en ce, qu'**au moins une unité directrice (7) et au moins une buse de pulvérisation (3) sont connectées au moins à un dispositif mélangeur (11) connecté au moins à un réservoir d'eau (12).
5. Le dispositif de pulvérisation selon une des revendications précédentes, **caractérisé en ce, qu'**au

moins une unité directrice (7) est connectée à distance au centre de direction.

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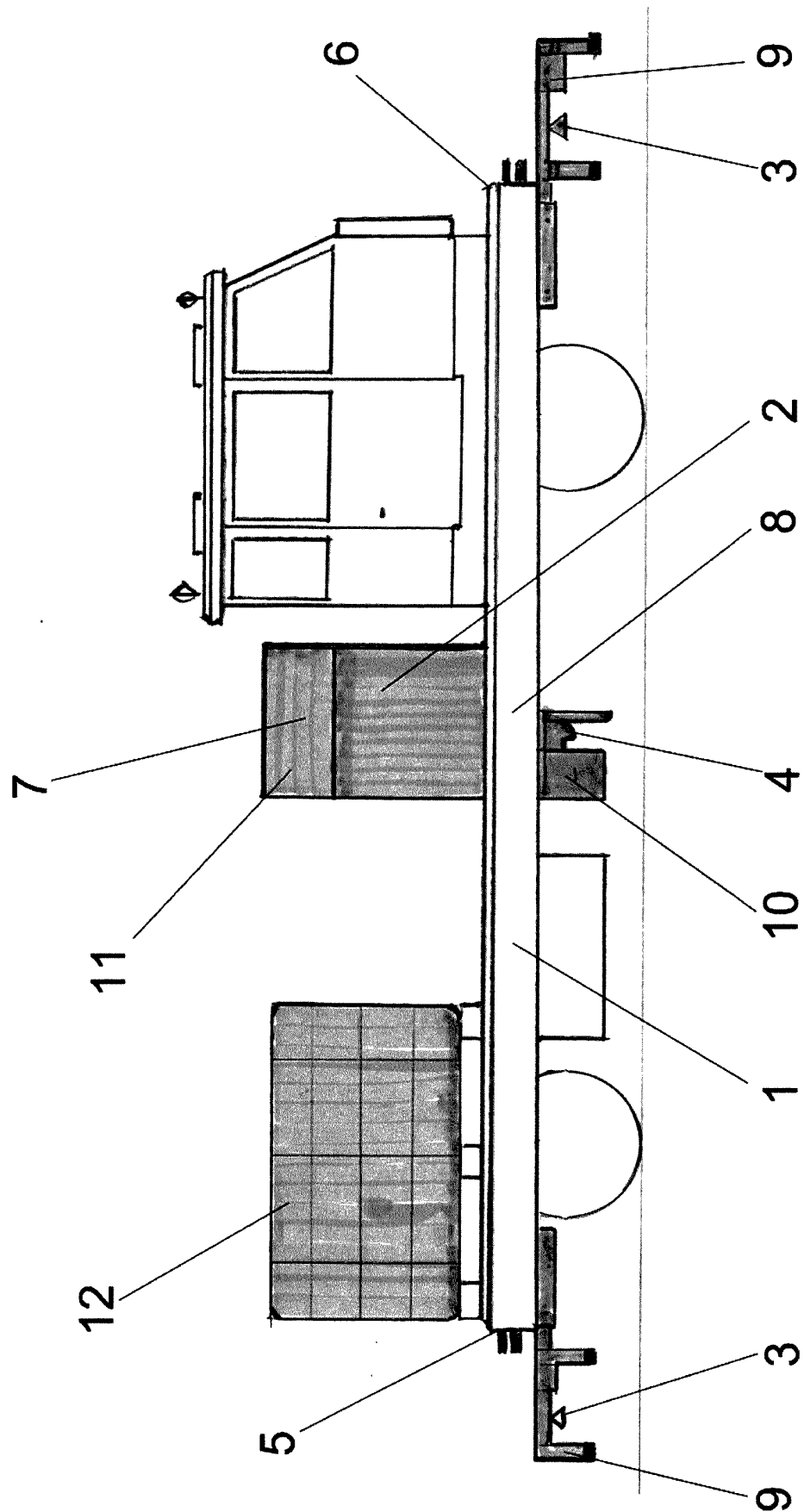
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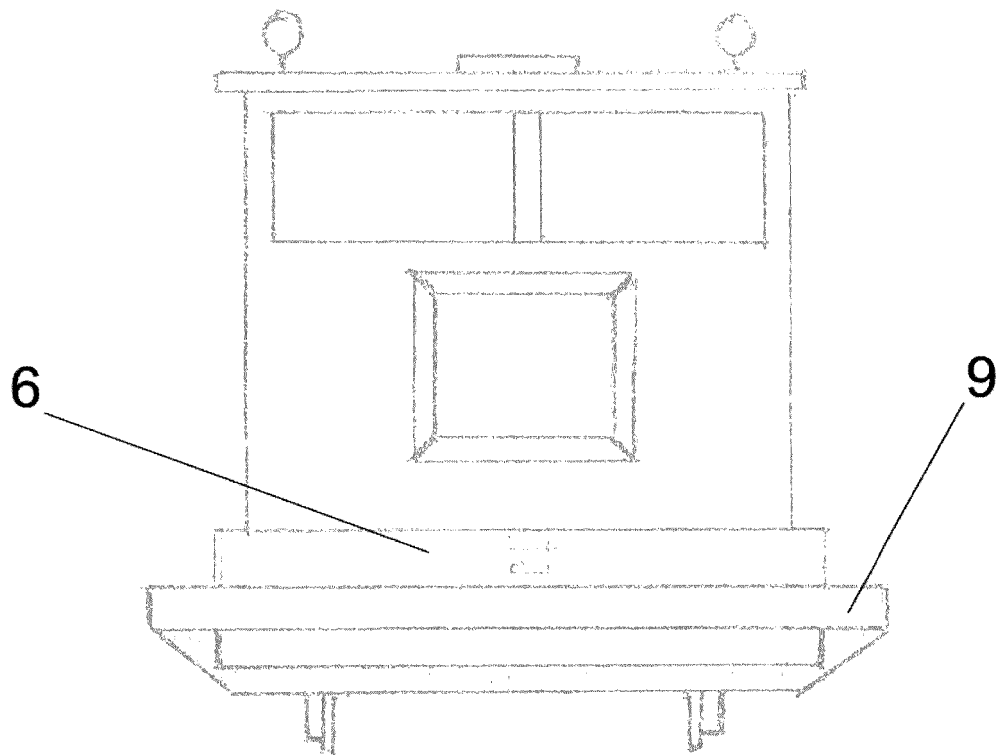


Fig.2

REFERENCES CITED IN THE DESCRIPTION

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