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(54) Title: DEVICE AND METHOD FOR REPAIRING A VERGE

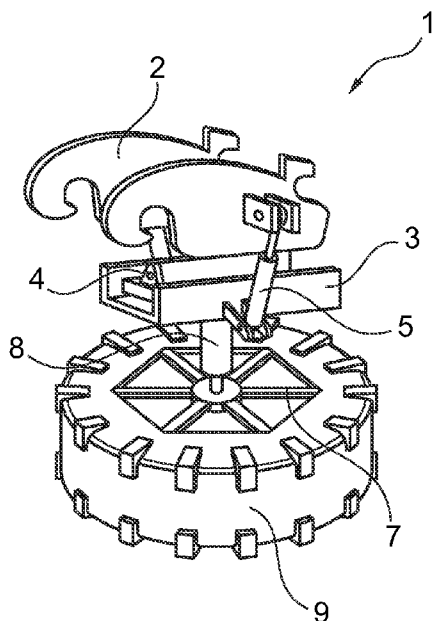


Fig. 1

(57) Abstract: The invention relates to a device for repairing a verge, which device comprises: -a base frame for attaching the device to a mobile tool, such as a crane; -a subframe arranged on the base frame; and -a flexible sleeve which is arranged on the subframe and revolves so as to be movable with respect to the base frame. In addition, the invention comprises a method for repairing a verge.



Device and method for repairing a verge.

The invention relates to a device for repairing a verge.

5           In particular in areas outside towns and cities, the problem occurs of damage to verges of roads, such as country roads. The relatively narrow roads force the traffic to use the verges when trying to avoid or overtake other traffic. In bends, damage is also caused by the fact that traffic cuts off  
10 corners or takes the bends too wide. This may result in deep trenches and trails and often produces dangerously high and steep edges on the side of the metalling of the road. Once these trenches and trails have formed, the process of deepening is accelerated by the fact that precipitation  
15 collects in the lower parts. This water leads to soft mud in the trenches which is easily moved along when a vehicle drives through the trenches again.

In addition, the road surface itself may become damaged as the road surface is no longer supported at the  
20 location of the trenches. As a result thereof, the road surface can easily cave in or break away.

It is therefore important to prevent damage to the verge or to repair any damage in time. Damage may be prevented by covering the verge with strips of rubble or by laying grass  
25 concrete blocks. The drawback of this solution is the high cost associated with arranging the rubble or the grass concrete blocks on the verge.

In addition, it is often not desirable to give traffic users the impression that the road has been widened by  
30 providing metalling next to the standard road, since this results in an increase in travelling speed and consequently leads to dangerous traffic situations.

On the other hand, it is possible to repair the

verge regularly. This is usually carried out by means of a crane provided with a scoop which removes portions of the verge and fills up the trenches again therewith. However, this is very labour-intensive and time-consuming. In addition,  
5 there is a risk that the scoop may damage the road surface.

It is now an object of the invention to reduce or to prevent the abovementioned drawbacks.

This object is achieved by a device according to the preamble, which device comprises:

- 10           - a base frame for attaching the device to a mobile tool, such as a crane;  
              - a subframe arranged on the base frame; and  
              - a flexible sleeve which is arranged on the subframe and revolves so as to be movable with respect to the  
15 base frame.

As a result of the revolving movement of the sleeve, parts of the verge can be scraped off and moved to the trench in the verge. The revolving movement is a continuous movement, unlike, for example, the to-and-fro movement of a scoop of a  
20 crane, as is the case in the prior art. When the flexible sleeve is pushed against the edge of the road surface and the verge, the sleeve may start to revolve of its own accord, due to the difference in friction, thus distributing the parts of the verge evenly.

25           In addition, the flexible sleeve ensures that sufficient pressure can be exerted to be able to scrape off parts of the verge, while minimizing damage to the road surface or other hard parts on the verge. Moreover, the flexible sleeve will adapt to the uneven structures present in  
30 the verge, thus producing optimum contact between the device and the verge.

The advantage of using a flexible sleeve is that the pressure can readily be adjusted. A crane can push the device

onto the ground and, due to the fact that the flexible sleeve is compressed, the pressure is increased more slowly than would be the case if a non-flexible part were to be pushed onto the ground, such as a steel scoop of a crane.

5           In a preferred embodiment of the device according to the invention, the subframe is arranged on the base frame in a rotating manner and the flexible sleeve is arranged around the subframe. By driving the subframe in a rotating manner, a strong and reliable device is thus produced.

10           In another preferred embodiment of the device according to the invention, the flexible sleeve is a vehicle tyre, such as a tyre of a tractor.

          Vehicle tyres are readily available, so that they can quickly be replaced when the flexible sleeve becomes  
15 damaged. Moreover, vehicle tyres are designed to be durable and resistant to wear, which is a considerable advantage with this invention.

          The flexible sleeve may also be shaped by a large number of rigid elements which are resiliently mounted and  
20 which together form a flexible sleeve. Another embodiment of the invention comprises a conveyor belt which is arranged between at least two turning wheels on the subframe, in which case the flexible sleeve is formed by at least one edge of the conveyor belt.

25           Using a conveyor belt, it is possible to produce an elongate, continuous sleeve, allowing a wider area of a verge to be levelled. Another preferred embodiment of the device according to the invention comprises tilting means for tilting the subframe with respect to the base frame. When the device  
30 is attached to a moving vehicle, the position of the vehicle with respect to the surface of the verge may prevent the device from being used efficiently. Due to the tilting means, it is possible to align the position of the device correctly

with respect to the road surface and the surface of the verge.

Yet another embodiment of the device according to the invention comprises drive means for continuously driving the sleeve. Preferably, the drive means comprise a hydraulic  
5 motor.

Driving the subframe results in a constant rotation of the subframe, as a consequence of which the evening out of the verge takes place in a more reliable manner. In this case, the use of a hydraulic motor has the advantage that a large  
10 force can be transmitted. In addition, the mobile tools to which the device can be fitted are often provided with a hydraulic system.

The invention furthermore relates to a method for repairing the verge of a road using a device according to the  
15 invention, which method comprises the following steps:

- positioning the device according to the invention with respect to the road in such a manner that the plane of movement of the sleeve is substantially parallel to the road surface;
- 20 - pushing a part of the flexible sleeve onto the edge of the road, adjacent to the verge to be repaired, with the remaining part of the flexible sleeve extending across the verge;
- moving the device along and parallel to the edge  
25 of the road, with the sleeve revolving and displacing parts of the verge in such a way that the verge is evened out.

Pushing a part of the flexible sleeve onto the edge of the road, with the remaining part of the flexible sleeve extending across the verge, ensures that the levelled verge  
30 merges with the road smoothly.

In addition, by tilting the device, the angle of the surface of the verge with respect to the road surface can be adjusted.

A preferred embodiment of the method according to the invention comprises the step of tamping down the parts which have been evenly distributed across the verge. When the parts of the verge have been scraped off by the device and  
5 evenly distributed across the verge, it is preferable to tamp down these parts again.

Although the parts will grow together of their own accord as a result of, for example, the grass or other plants in the scraped-off parts, it is preferable to tamp down the  
10 parts. This ensures that the parts, as long as the parts have not grown together, do not become dislodged again easily, for example when a vehicle drives over the verge.

In a highly preferred embodiment of the method according to the invention, the device according to the  
15 invention is fitted to the arm of a mobile crane and the crane tamps down the parts which have been evenly distributed across the verge with at least one wheel.

These and other features of the invention are explained in more detail with reference to the attached  
20 drawings, in which:

Fig. 1 shows a perspective view of a first embodiment of the device according to the invention;

Fig. 2 shows a front view of the device from Fig. 1 during use;

25 Fig. 3 shows a perspective view of the device from Fig. 1 fitted to a crane.

Fig. 1 shows a device 1 for repairing a verge. The device 1 has a two-part base frame 2, 3 which can be coupled to the arm of a crane, for example.

30 The two parts 2, 3 of the base frame are hingedly connected to each other via hinge pin 4. By means of hydraulic cylinders 5, 6, the position of the bottom part 3 of the base frame with respect to the top part 2 can be adjusted.

A subframe 7 is fitted to the bottom part 3 and can rotate with respect to the bottom part 3. In this case, a hydraulic motor is provided in the shaft 8 to actively drive the subframe 7.

5           The subframe 7 is provided with a flexible sleeve 9 which, in this embodiment, is a tractor tyre. In this way, an inexpensive, yet durable and wear-resistant flexible sleeve 9 is provided.

10           Fig. 2 shows a front view of the device 1 from Fig. 1 during use. A part of the flexible sleeve 9 of the device is pushed onto the edge 10 of the road surface. In this case, the flexible sleeve 9 will be slightly compressed, resulting in good contact. By now moving the device along the edge 10 of the road surface, the subframe 7 will revolve of its own  
15 accord. However, by using the hydraulic motor 8, a reliable and continuous rotation of the subframe 7 will be achieved.

          The remaining part of the flexible sleeve 9 is situated on the verge 11, in which a trench 12 is formed. However, the flexible sleeve 9 will scrape off parts of the  
20 verge 11 and move them to the trench 12 so that the verge 11 is restored.

          Fig. 3 shows the device 1 fitted onto the arm 13 of a mobile crane 14. By means of the flexible sleeve 9 of the device 1, parts 15 of the verge 11 are loosened and pushed  
25 into the trench 12.

          While the device 1 is being moved along the edge of the road 10, the crane 14 will also move across the road, in which case the wheels 16 of the crane 14 tamps down the parts 15 of the verge 11 which have been pushed into the trench 12.

## Claims

1. Device for repairing a verge, which device comprises:

- 5                   - a base frame for attaching the device to a mobile tool, such as a crane;  
                  - a subframe arranged on the base frame; and  
                  - a flexible sleeve which is arranged on the subframe and revolves so as to be movable with respect to the  
10 base frame.

2. Device according to Claim 1, in which the subframe is arranged on the base frame in a rotating manner and in which the flexible sleeve is arranged around the subframe.

- 15                   3. Device according to Claim 2, in which the flexible sleeve is a vehicle tyre, such as a tractor tyre.

4. Device according to Claim 1, comprising a conveyor belt which is arranged between at least two turning wheels on the subframe, in which the flexible sleeve is formed  
20 by at least one edge of the conveyor belt.

5. Device according to one of the preceding claims, comprising drive means for continuously driving the sleeve.

6. Device according to Claim 5, in which the drive  
25 means comprise a hydraulic motor.

7. Device according to one of the preceding claims, comprising tilting means for tilting the subframe with respect to the base frame.

8. Method for repairing a verge of a road using a  
30 device according to one of the preceding claims, which method comprises the following steps:

- positioning the device according to the invention with respect to the road in such a manner that the plane of

movement of the sleeve is substantially parallel to the road surface;

- pushing a part of the flexible sleeve onto the edge of the road, adjacent to the verge to be repaired, with the remaining part of the flexible sleeve extending across the  
5 verge;

- moving the device along and parallel to the edge of the road, with the sleeve revolving and distributing parts of the verge evenly across the verge.

10 9. Method according to Claim 8, furthermore comprising the step of tamping down the parts which have been evenly distributed across the verge.

15 10. Method according to Claim 9, in which the device according to the invention is fitted to the arm of a mobile crane and in which the crane tamps down the parts which have been evenly distributed across the verge with at least one wheel.

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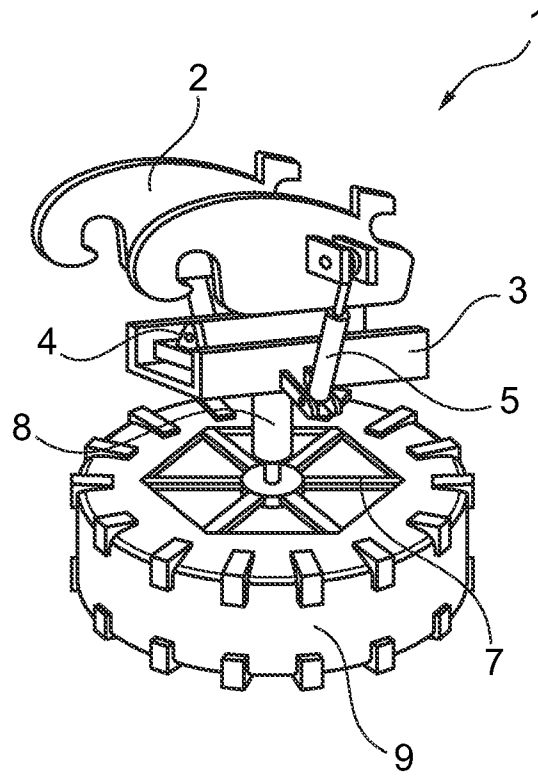


Fig. 1



Fig. 2

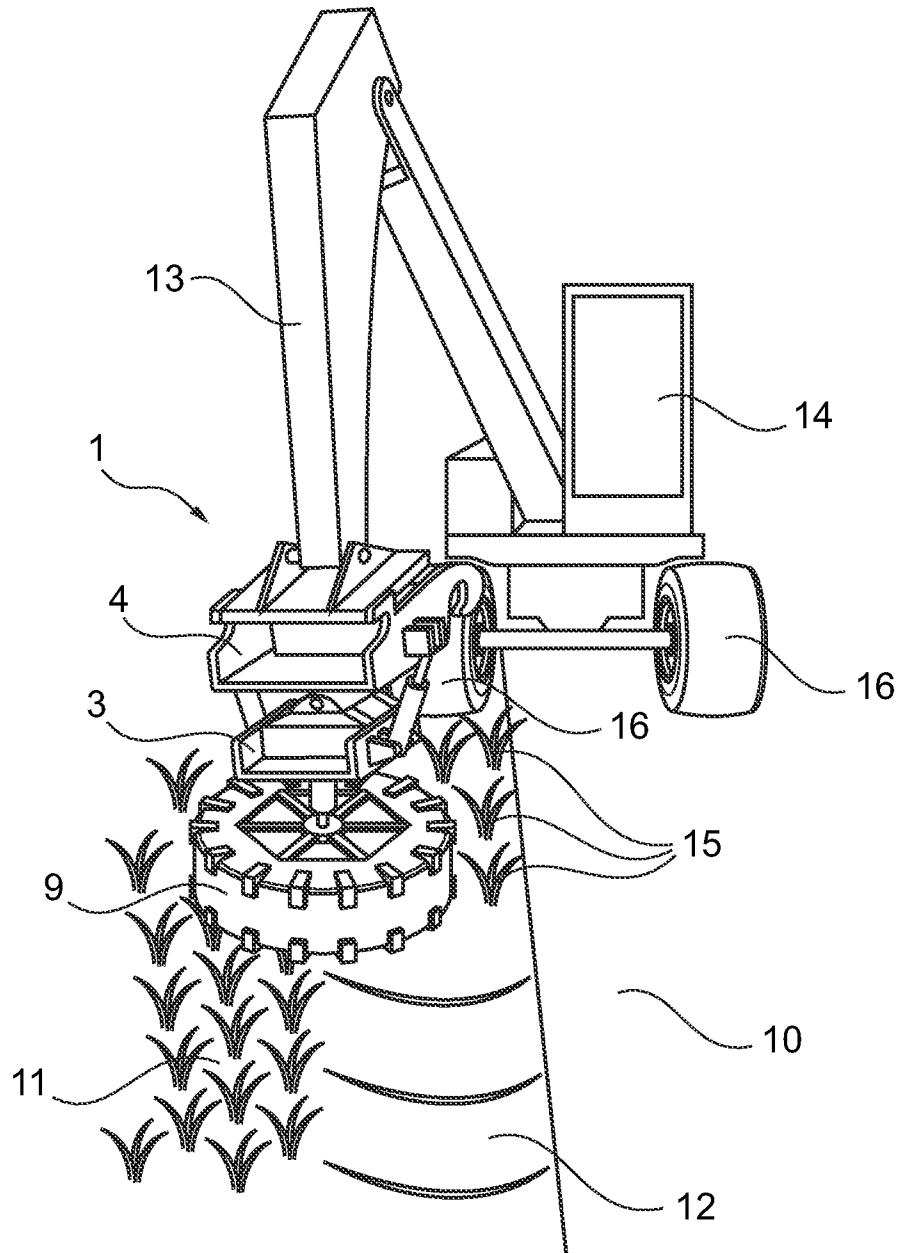


Fig. 3

**INTERNATIONAL SEARCH REPORT**

International application No PCT/NL2012/050787
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**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. E01H1/00 E02F3/815 E02F3/78 E01C19/15 E01C23/06  
 E01C23/088 E02D3/039  
 ADD.  
 According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**  
 Minimum documentation searched (classification system followed by classification symbols)  
 E01H E02F E01C E02D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
 EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SU 567 800 A1 (PETRENKO MIKHAIL N [SU]) 5 August 1977 (1977-08-05) the whole document -----	1
X	DE 198 51 828 A1 (PAULI KASPAR [DE]) 11 May 2000 (2000-05-11) the whole document -----	1,2,5-10
X	DE 31 01 216 A1 (SCHLICKSBIER JOSEF ING GRAD) 2 September 1982 (1982-09-02) abstract; figures -----	1,4
A	DE 296 18 367 U1 (BUERKLE SIEGFRIED [DE]) 6 March 1997 (1997-03-06) the whole document -----	1,8

Further documents are listed in the continuation of Box C.  See patent family annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  1 February 2013	Date of mailing of the international search report  11/02/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Movadat, Robin
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International application No PCT/NL2012/050787
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