EUROPEAN PATENT SPECIFICATION

DEVICE FOR PRE-CRACKING IN THE FRESH STATE AND FILLING OF CRACKS IN CEMENT ROAD BASES

VORRICHTUNG ZUR RISSEINLEITUNG IM FRISCHZUSTAND UND FÜLLEN VON RISSEN IN ZEMENTSTRASSENBASEN

DISPOSITIF DE PREFISSURATION A L'ETAT FRAIS ET DE COMBLEMENT DE FISSURES DANS DES REVETEMENTS EN CIMENT

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Description

Technical field

[0001] This invention, as expressed in the wording of this description, relates to a device to perform cracks and simultaneously fill them in on cement road bases, the purpose of which is to perform automatically and/or mechanically pre-cracking of transversal cracks on road bases made of cement-pavement or gravel-cement, so that in addition to preventing the closing of joints during compacting, allow the transition of loads between both sides of the joint, performing the operation before proceeding to the definitive asphaltling of the road. It is therefore an invention related to the construction, repair, reconditioning and placing of roads and similar surfaces.

[0002] The technical sector where this device is used is mostly related to the execution of public works (motorways, roads, paths, car and motorcycle race tracks, etc.), as opposed to private works; hence the technological development has been little or limited to the resolution of specific problems by contractors in the private sector on the road bases and sides where they operate. Hence, we note as past records, the Patent of the German Democratic Republic no. DD229176 by FRITZ MENZEL (21-11-1984) or the French Patent no. FR2754551 SAT, SOCIÉTÉ ANONYME DE TÉLÉCOM-MUNICATIONS (15-10-1996), on towing frame, but does not include a runner.

[0003] All the above different to this invention, in the method of performing cracks and grooves as in the Patent of the German Democratic Republic and by the configuration of the device that performs the cracks and grooves, described in the French Patent.

Technical problem

[0004] As it is known, during the execution of public works corresponding to road bases for vehicles, the first operation is to form a compacted road base that is usually made of a mixture of artificial gravel, or cement combined with suitable aggregates, in order to obtain a thick base layer that is compacted suitably to later place the final asphalt layer over it. On the aforementioned road base, a series of transversal cracks are made and then are filled with a bituminous material, which is later compacted to finally place the asphalt layer. From the above, the invention presented as described in claim 1 resolves the pre-cracking and filling of cement road bases are resolved in the most advantageous manner from a financial and functional perspective, providing great performance on cement road bases of any width.

[0005] The operation of performing cracks is normally performed with conventional machines that are usually constituted to perform other types of specific works; therefore the performance is not optimum.

[0006] In addition, the filling of figures with the bituminous product is normally performed in a practically manual and rudimentary manner, using sprays and/or vessels that pour a layer of bituminous product, which is very slow, imperfect in its execution, requires more than one operator, and ultimately represents a notable financial cost that does not improve the efficiency with regards to the finish and subsequent performance of the cracks performed, nor of course the execution performance.

Technical solution

[0007] From the above, the invention presented as defined in claim 1 resolves the pre-cracking and filling of cement road bases are resolved in the most advantageous manner from a financial and functional perspective, providing great performance on cement road bases of any width.

[0008] The advantages of the device invented are numerous, including:

- Lower cost with regards to other methods used for the same purpose.
- Allows performing the process by a single operator.
- Speed of execution of craking or joints, as it can be mounted on any traction vehicle with great manoeuvrability.
- Minimum damage of extended cement layer, given that the type of vehicle used for the device of the invention is light and weighs little.
- Autonomy for displacement in changing cuts, procurement of bituminous product to use, fuel, etc.
- Low cost in the acquisition and maintenance of the vehicle.
- Minimum costs shipping the vehicle, due to its reduced dimensions and weight.
- Minimum manufacturing costs of elements or tools necessary to couple on the vehicle thanks to its reduced size.
- Possibility of coupling the device to any part of the vehicle, either at the front, rear or sides, or at different angles, which enables better and more comfortable application of the bituminous product by the operator handling the device towing vehicle.

Brief description of drawings

[0009] In order to complement the description and so that help to better understand the characteristics of the invention, the following description includes a series of drawings that shall help to better understand the innovations and advantages of the device subject of the invention.

Figure 1. Shows a general perspective of the device invented ready to be mounted on the rear of a towing vehicle, such as a small tractor, quad, etc.

Figure 2. Shows a practical use of the device represented in the previous figure, on the upper part of a tractor vehicle, which includes the corresponding
bituminous product tank, as well as the hose or connection conduit between such tank or the pump for the bituminous product and blade that performs the cracks and its filling.

**Figure 3.** Shows a schematic view of a side of the device invented, which shows the bitumen being projected.

**Figure 4.** Shows a view as in figure 1, but with the device ready to be mounted on the side of the vehicle or small tractor.

The mode for the Invention

[0010] In light of the commented figures, one can see the device invented involves a blade (1) that, in the represented execution form, presents a trapezoid configuration with its front and rear edges (2) in angular form to define attack edges that allow driving and sliding the blade in the ground, specifically on the compacted surface on which the cracks shall be performed with the device.

[0011] At the rear end, the blade (1) shall include some holes (3) through which the bituminous material shall be projected (4) to fill the cracks performed by the blade as it progresses over the compacted surface.

[0012] Over the upper edge of the mentioned blade (1) a rectangular plate is solidly connected (5) with its front part (6) slightly curved up providing a skate over the compacted surface, in which the blade (1) through its attack edges (2) is driven into the surface and performs the crack which is simultaneously filled in with the bituminous material (4) that is projected through the holes (3) on the rear edge of the blade (1).

[0013] A structure is secured to the runner (5) and blade (1) frame, which is used to assembly it to a towing vehicle (21), such as a small tractor, quad, etc., vehicle that conveniently also includes a tank (7) of bituminous material, that through a pump and other elements, and a conduit or hose (8) is pumped to the blade (1) through a connection adapter (9) established on the upper part of the runner (5).

[0014] The securing frame of the device to the towing vehicle (21) includes a first vertical arm (10) that holds an articulated horizontal arm (11); in between this arm and the lower part of the assembly includes a manual lever (12) that can be positioned in different points throughout the horizontal arm (11) and achieve therefore different blade (1) attack angles with regards to the compacted surface.

[0015] The referred horizontal arm (11), is connected, but can be removed, to a vertical arm (13) that on the upper end is finished with a fork (14) to secure to the towing vehicle (21), through a hydraulic or similar system (16), while the lower end includes a solidly connected crossbeam (15) that is also used to secure and assembly the device to the aforementioned towing vehicle (21). The hydraulic means (16), such as cylinders or similar elements, in addition to fulfilling the assembly function, provide the function of elevation and lowering elements of the device assembly to achieve work or transport positions; in the first case providing greater or lesser depth of the blade (1) in the compacted surface, which towed by the vehicle (21) which in turn injects the bituminous product (4) contained in the tank (7) over the crack that is performed by the blade (1) in their progress over compacted land.

[0016] An alternative for assembling the device, as shown in the Figure 4, is mounted on the side of the vehicle (21), for which the arm has been provided (21), where the device is mounted, is joined by its rear end of an element or side crossbeam (17) secured between a rear frame (18) that projects the vertical arm (13) finished on the fork (14) to secure it to the vehicle through the hydraulic system or similar 16. Said side crossbeam 17 is linked by its front end to another front frame (19) through a connecting rod (20) or suitable articulation element. In this variant, with regards to the device assembly, the operation and functionality is exactly the same when it is mounted on the rear, as represented in the Figure 1.

**Claims**

1. A device for the pre-cracking in the fresh state and the filling of cracks on cement road bases, and to produce mechanically and/or automatically the transverse cracks that are normally provided in road bases or surfaces which are treated with cement and which are intended to serve as a base for the corresponding asphalt layer in the construction of roadways, the device being usable to fill the aforementioned cracks using a bituminous product, in order to eliminate or reduce crack reflection in said compacted surfaces, characterized by a vertical blade (1) comprising outlet holes (3) for the bituminous product (4), and a horizontal plate which is solidly connected to the upper edge of the blade (1) the front edge of said plate (5) being arched upwards (6), such as to define runner which slides along the surface penetrated by the blade (1), thereby, forming a crack which can be simultaneously filled in with bituminous product (4) projected through the outlet holes (3) in the rear edge of the blade; the runnerblade assembly is solidly connected to a frame so that it can be hitched to a towing vehicle (21) such as a small tractor, quad or similar.

2. A device for the pre-cracking in the fresh state and the filling of cracks on cement road bases, as per Claim 1, characterized because the blade (1) presents its front and lower edges (2) at an angle, determining an attack edge for cutting and sliding over the surface.
A device for the pre-cracking in the fresh state and the filling of cracks on cement road bases, as per Claims 1 and 2, characterized because the blade (1) is assembled on the runner plate (5), which can be removed.

A device for the pre-cracking in the fresh state and the filling of cracks on cement road bases, as per Claim 1, characterized because the frame secured to the upper part of the runner (5), consists of a vertical arm (10) that mounts a horizontal articulated arm (11) connected to a manual lever (12) that links said arm (11) to the lower part of the frame, in order to achieve greater or lesser penetration and inclination of the blade attack angle (1) on the floor; with the specifics that such association between the lever (12) and the horizontal arm (11) is established after the articulation point of said horizontal arm (11) and the vertical arm (10).

A device for the pre-cracking in the fresh state and the filling of cracks on cement road bases, as per Claim 4, characterized because the front end of the horizontal arm (11) is secured to a second vertical arm (13) with a lower crossbeam (15) and an upper fork (14), for connecting the assembly to suitable securing means on the corresponding towing vehicle (21).

A device for the pre-cracking in the fresh state and the filling of cracks on cement road bases, as per Claim 4, characterized because the horizontal arm (11) is connected to a lateral crossbeam (17) placed between a rear frame (18) and a front frame (19), duly mounted on the corresponding towing vehicle (21).

Vorrichtung für das Aufreißen im frischen Zustand und das Füllen von Rissen in Zementstraßengrundflächen nach Anspruch 1, dadurch gekennzeichnet, dass der Flügel (1) seine Vorder- und Hinterkanten (2) unter einem Winkel präsentiert, welcher eine Angriffsfäche für das Schneiden und Gleiten über die Oberfläche darstellt.

Vorrichtung für das Aufreißen im frischen Zustand und das Füllen von Rissen in Zementstraßengrundflächen nach Anspruch 1 und 2, dadurch gekennzeichnet, dass der Flügel (1) auf der Laufschiene-platte (5) montiert ist, welche abmontiert werden kann.

Vorrichtung für das Aufreißen im frischen Zustand und das Füllen von Rissen in Zementstraßengrundflächen nach Anspruch 1, dadurch gekennzeichnet, dass der an dem oberen Teil der Laufschiene (5) befestigte Rahmen aus einem vertikalen Arm (10) besteht, welcher einen mit einem Handhebel (12), der den genannten Arm (11) mit dem unteren Teil des Rahmens verbindet, verbundenen horizontalen, gegliederten Arm (11) hält, um eine größere oder geringere Penetration und die Neigung des Angriffs winkels des Flügels (1) gegenüber des Bodens zu erzielen; mit den Spezifika, dass eine solche Assozierung zwischen dem Hebel (12) und dem horizontalen Arm (11) hinter dem gegliederten Punkt des genannten horizontalen Arm (11) und des vertikalen Arms (10) etabliert wird.


6. Vorrichtung für das Aufreißen im frischen Zustand und das Füllen von Rissen in Zementstraßengrundflächen nach Anspruch 4, dadurch gekennzeichnet, dass der horizontale Arm (11) mit einem zwi-
schen einem hinteren Rahmen (18) und einem vor- 
deren Rahmen (19) angeordneten lateralen Quer- 
balken (17) verbunden ist, welcher formgerecht an 
dem dazugehörigen Schleppfahrzeug (21) befestigt 

Revendications

1. Dispositif pour la préfissuration à l’état frais et le rem- 
plissage de fissures sur des couches de base de 
routes en ciment, et utilisé pour produire mécanique- 
ment et/ou automatiquement les fissures transver- 
sales qui sont normalement produites dans les cou- 
ches de base de routes ou les surfaces qui sont trait- 
ées avec du ciment et qui sont prévues pour servir 
de couche de base pour la couche d’asphalte cor- 
respondante dans la construction de routes. Le dis- 
positif est également utilisé pour remplir les fissures 
susmentionnées en utilisant un produit bitumineux, 
afin d’éliminer ou de réduire la réflexion des fissures 
dans lesdites surfaces compactées, l’invention est 
caractérisée en ce qu’il est constitué d’une lame 
verticale (1) comprenant des orifices de sortie (3) 
pour le produit bitumineux (4), et d’une plaque hori- 
zontale qui est solidarisée avec le bord supérieur de 
la lame (1), le bord avant de ladite plaque (5) étant 
arqué vers le haut (6), de manière à définir un cou- 
lisseau qui coulisse le long de la surface pénétrée 
par la lame (1), formant ainsi une fissure qui est si- 
multanément remplie de produit bitumineux (4) pro- 
jeté par les orifices de sortie (3) dans le bord arrière 
de la lame ; l’ensemble coulisseau/lame étant soli- 
darisé à un cadre de manière à ce qu’il puisse être 
attaché à un véhicule de remorquage (21) tel qu’un 
petit tracteur, un quad ou un véhicule semblable.

2. Dispositif pour la préfissuration à l’état frais et le rem- 
plissage de fissures sur des couches de base de 
routes en ciment selon la revendication 1, carac- 
térisé en ce que la lame (1) présente ses bords avant 
et inférieur (2) à un angle, déterminant un bord d’at- 
taque pour la découpe et le coulissement sur la sur- 
face.

3. Dispositif pour la préfissuration à l’état frais et le rem- 
plissage de fissures sur des couches de base de 
routes en ciment selon les revendications 1 et 2, carac- 
térisé en ce que la lame (1) est assemblée sur 
la plaque du coulisseau (5), qui peut être retirée.

4. Dispositif pour la préfissuration à l’état frais et le rem- 
plissage de fissures sur des couches de base de 
routes en ciment selon la revendication 1, carac- 
térisé en ce que le cadre attaché à la partie supérieure 
du coulisseau (5) est constitué d’un bras vertical (10) 
qui monte un bras articulé horizontal (11) relié à un 
levier manuel (12) qui relie ledit bras (11) à la partie 
inférieure du cadre, afin de réaliser une pénétration 
et une inclinaison de l’angle d’attaque de la lame (1) 
sur le sol plus ou moins grandes ; à condition qu’une 
telle association entre le levier (12) et le bras hori- 
zontal (11) soit établie après le point d’articulation 
dudit bras horizontal (11) et du bras vertical (10).

5. Dispositif pour la préfissuration à l’état frais et le rem- 
plissage de fissures sur des couches de base de 
routes en ciment selon la revendication 4, carac- 
térisé en ce que l’extrémité avant du bras horizontal 
(11) est attachée à un second bras vertical (13) muni 
d’une traverse inférieure (15) et d’une fourche supé- 
rieure (14), pour relier l’ensemble à des moyens d’at- 
tache appropriés sur le véhicule de remorquage cor- 
respondant (21).

6. Dispositif pour la préfissuration à l’état frais et le rem- 
plissage de fissures sur des couches de base de 
routes en ciment selon la revendication 4, carac- 
térisé en ce que le bras horizontal (11) est relié à une 
traverse latérale (17) placée entre un cadre arrière 
(18) et un cadre avant (19), dûment montés sur le 
véhicule de remorquage correspondant (21).
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE DD229176, FRITZ MENZEL [0002]
- FR 2754551 [0002]