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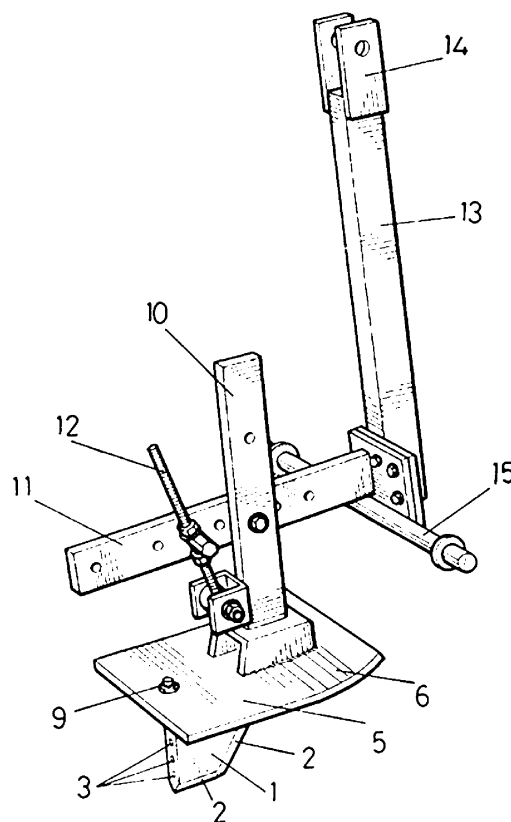
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(54) **DEVICE FOR PRE-CRACKING IN THE FRESH STATE AND FILLING OF CRACKS IN CEMENT ROAD BASES**

(57) The invention relates to a device for the pre-cracking in the fresh state and the filling of cracks in cement road bases. The inventive device is used 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. In addition, the device is also used to fill the aforementioned cracks using a bituminous product in order to eliminate or reduce crack reflection in said compacted surfaces. According to the invention, the device consists of: a vertical blade (1) comprising outlet holes (3) for the bituminous product (4); and a horizontal plate (5) which is solidly connected to the upper edge of the blade (1), the front edge of said plate being arched upwards (6), such as to define a runner which slides along the surface penetrated by the blade (1), thereby forming a crack which is simultaneously filled with the bituminous product (4) which is projected through the outlet holes (3) in the rear edge of the blade. The runner/blade assembly is solidly connected to a frame so that it can be hitched to a towing vehicle (21) such as a small tractor, a quad or similar.



**FIG.1**

## 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 asphaltting of the road. It is therefore an invention related to the construction, repair, re-conditioning 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.

[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 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 is used 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 is also used to fill the aforementioned cracks using a bituminous product, in order to eliminate or reduce crack reflection in said compacted surfaces, the invention is **characterized** because it consists of 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 is simultaneously filled in of bituminous product (4) projected through the outlet holes (3) in the rear edge of the blade; the runner/blade 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.
3. 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.

4. 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).
5. 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).
6. 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).

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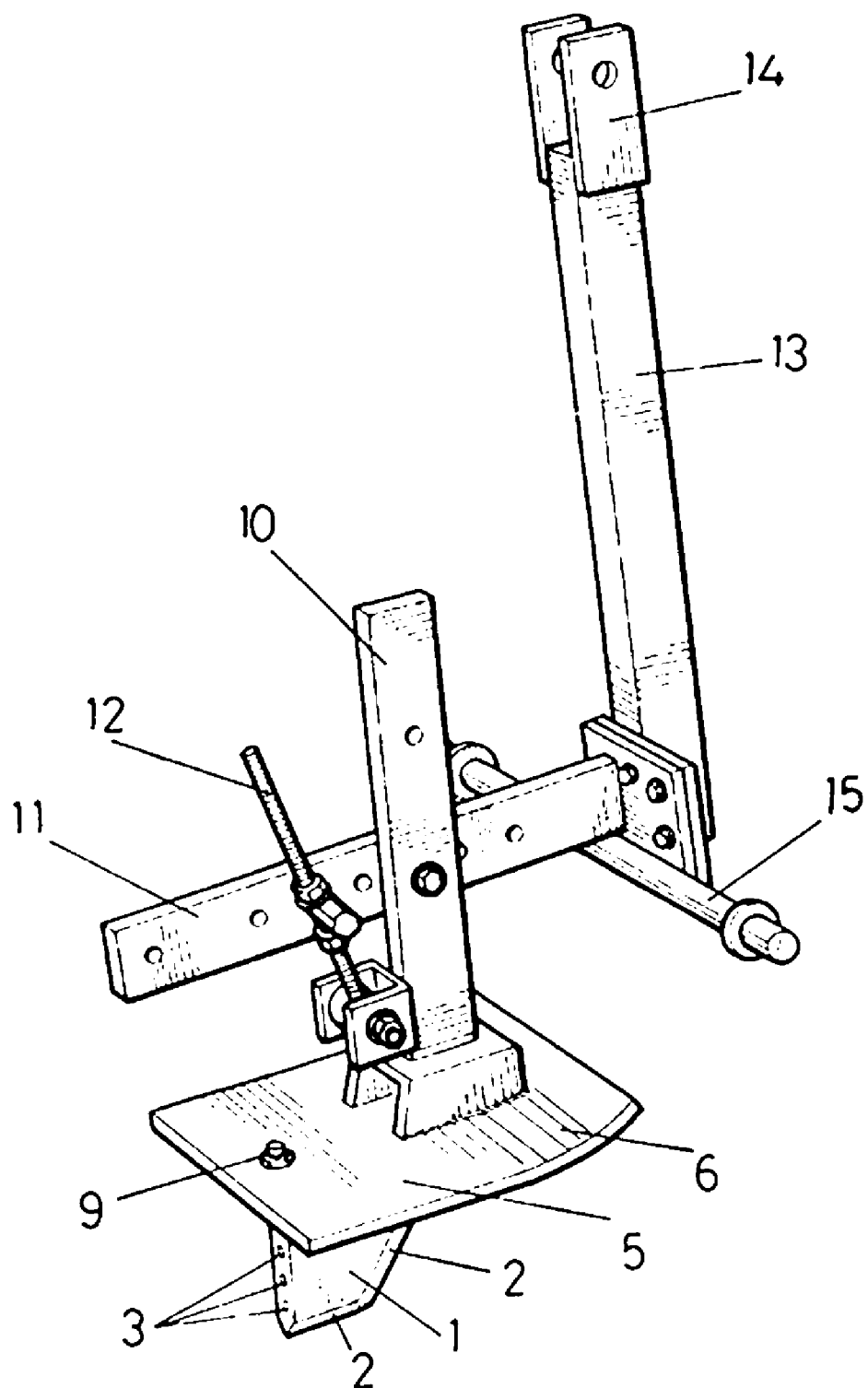


FIG.1

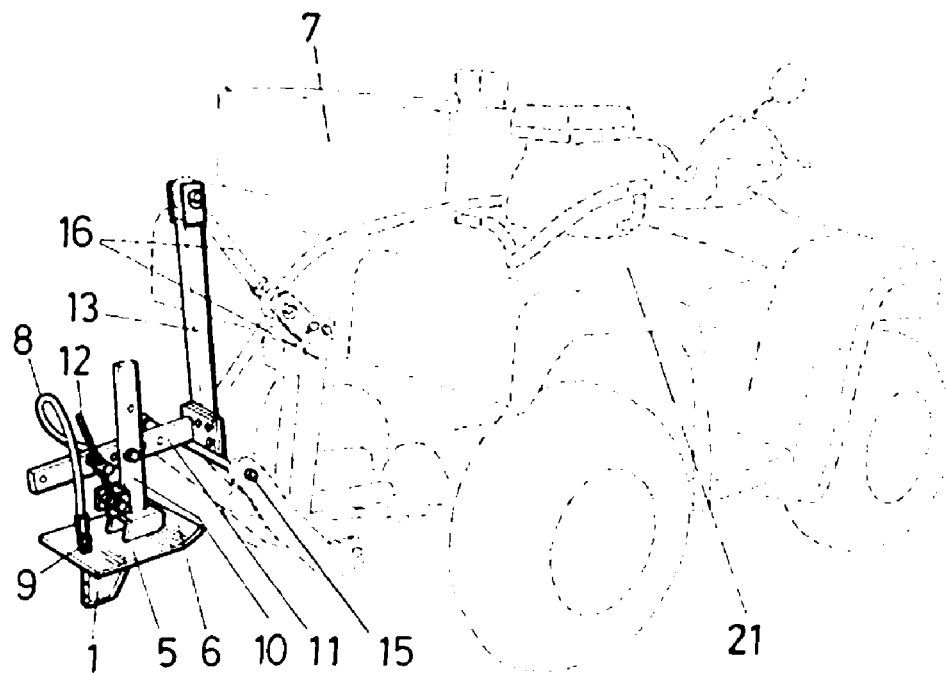


FIG. 2

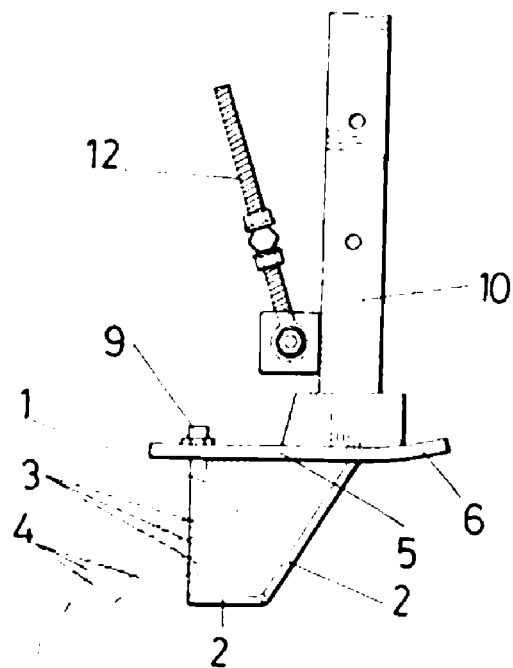


FIG. 3

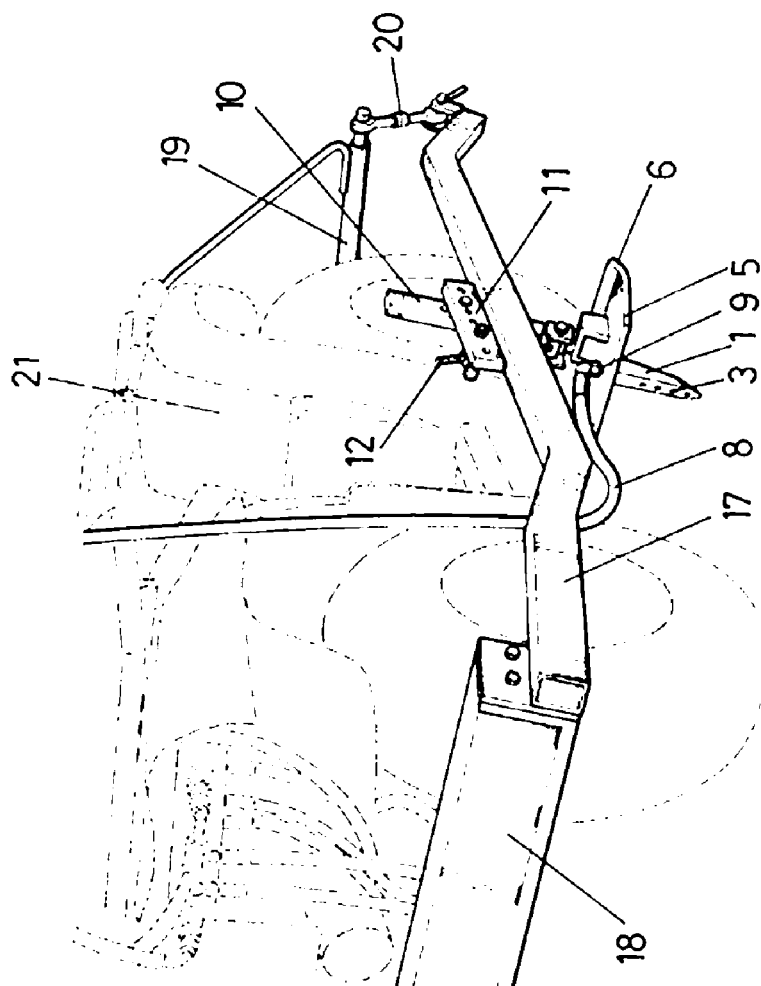


FIG. 4

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/ ES 2005/070059

A. CLASSIFICATION OF SUBJECT MATTER		
<b>IPC7</b> E01C 23/02 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)		
<b>IPC7</b> E01C		
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)		
CIBEPAT,EPODOC,WPI,PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0338242 A1 (KIRCHHOFF GMBH F) 25.10.1989, column 8, lines 11-41; figures 1,3	1,2
A		3
Y	ES 2034713 T3 (ETAT FRANÇAIS LAB CENTRAL PONTS ET CHAUSSEES) 01.04.1993, column 5, lines 2-31; figures 3,5	1,2
A	US 3791696 A (RILEY M) 12.02.1974, <b>Abstract</b> figures.	4
A	DD 272578 A3 (VERKEHRS & TIEFBAU KOM) 18.10.1989, figure 1.	4
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
<b>08 September 2005 (08.09.2005)</b>		<b>19 September 2005 (19.09.2005)</b>
Name and mailing address of the ISA/		Authorized officer
<b>S.P.T.O.</b>		
Facsimile No.		Telephone No.



# EP 1 752 581 A1

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No  
PCT/ ES 2005/070059

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US 3791696 A	12.02.1974	NONE	
DD 272578 A3	18.10.1989	NONE	

Form PCT/ISA/210 (patent family annex) (July 1992)

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- DD 229176 [0002]
- FR 2754551 [0002]