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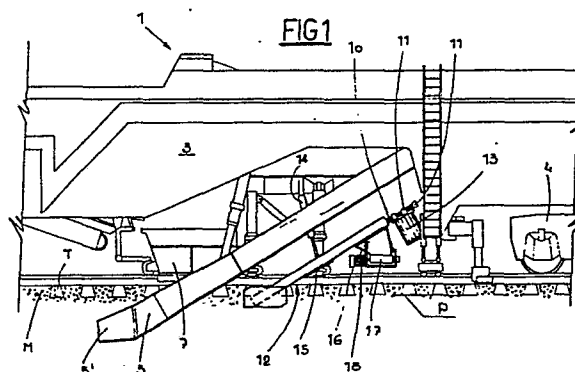
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54 **Device for regulating the substructure of ballast on railway tracks.**

57 The device in question consists of an endless chain (10) that slides inside a guide channel (12) placed, over a given distance (20), transversely to the rails, underneath the substructure of the sleepers and downstream of the main digging channel (5), or cutter with which machines utilized for this purpose are provided. The guide channel has, bilaterally, two sections (12') and (12'') that slope vertically and converge in a horizontal plane, the lower part of these being equipped, in the region of the lateral extremities of the sleepers, with a trap-door (15) for discharging on to the said sleepers, the metalling conveyed by the chain. A horizontal conveyor (17) is positioned transversely with respect to the rails, beneath the highest section of the chain, in order to receive the metalling issuing there from but not discharged on to one extremity of the sleepers, this being designed to discharge the said metalling on to the opposite extremity.



Device for regulating the substructure of ballast on  
railway tracks

The invention relates to a device for regulating the substructure of ballast on railway tracks.

Track maintenance operations call for the deployment of  
5 a considerable labour force that has to do a heavy job completely out in the open. This is one of the reasons why the study and introduction of semi-automatic machines able to notably reduce the labour required, has been commenced.

10 Other motives that have led to the introduction of these machines are their major precision and the greater volume of work it is possible to handle in a unit of time, together with fuller use being made of intervals in between one train and another. In this way, it is possible to  
15 achieve non-operative periods of sufficiently short a duration to render the use of the said machines financially opportune.

Among the machines of the type stated, some for the renewal  
20 of the ballast are known that work on the railway underneath the track without touching the latter, with the track being left in its original position. The machines in question are autonomous and are able to perform operations of breaking up, digging, conveying the old ballast to the  
25 riddles and screening it, and of recovering and redistributing the screened metalling on to the railway, as well as of rejecting the screened residue. The digging is generally done with a continuous chain cutter that extends transversely to the track, is placed underneath the substructure  
30 of the sleepers, and conveys the metalling to the purposely provided riddles where the minute parts are separated from

the utilizable metalling, while conveyor belts attend to the distribution of the screened metalling to underneath the sleepers, and to the ejection of the non-utilizable metalling.

5

This succession of operations, which tends to renew the ballast using one single machine, creates in practice, as the renewed metalling leaves the distributor, new ballast of irregular level, and this is both because of the depressions  
10 that form along the old railway track on account of the physical conditions of the ground differing from one section to another, and because of the different degree of "pollution" of the ballast itself.

15 In this connection it is, therefore, necessary to smooth the level of the ballast; and at present this is done with the use of a bar (or in some cases, with the use of a vibrating share), placed horizontally downstream of the preceding "digging channel", with respect to the horizontal  
20 movement direction of the machine, transversely to the track, the extremities of the said bar being designed to hook on to a pair of arms that protrude laterally from the said machine. The insertion of the bar, which constitutes a guide structure for a pair of chains equipped with claws,  
25 used to remove the excess metalling and to convey it to the edges of the ballast is, for example, done with the use of derrick cars which place the bar in position in such a way that it can easily be hooked on to the said arms.

30 Furthermore, each claw equipped chain is powered by drive means placed on the end of the bar.

The regulating bar is able to rotate around its own axis, transversely to the track, and to be locked at a suitable  
35 inclination with respect to the railway track on which the

screened metalling is to be distributed, while each of the  
aforementioned support arms is able, through oil hydraulic  
mechanism, to lengthen until it has coupled with the said  
bar, and to shorten once the latter has been removed at the  
5 end of the operation.

The obvious disadvantage with this type of device for reg-  
ulating the substructure of ballast is that of having neces-  
sarily to use either a derrick car or else a large amount  
10 of labour each time the bar has to be placed in position  
for it to be hooked on to the support arms and each time  
it is wished to withdraw the bar upon completion of the reg-  
ulating operation, which also involves the necessary oper-  
ations of hooking the bar on to the arms and of unhooking  
15 it there from. Furthermore, when the said bar is left in  
line, it occupies a considerable amount of ballast and thus  
modifies the characteristics thereof over a relatively ample  
section.

20 With the aforementioned method, the renewal of the railway  
ballast is achieved in the way that it is carefully screen-  
ed, reintegrated and redistributed underneath the substruct-  
ure of the sleepers. Downstream, however, the said machines  
require other special machines to be used to distribute the  
25 metalling in the areas where it is missing and, above all,  
in the region of the extremities of the sleepers and,  
through the medium of various devices, to level the track  
in order to allow rolling stock to pass, at adequate tran-  
siting speeds, over the section subjected to renewal (once  
30 the maintenance equipment has been dismantled).

The essential object of the invention is, therefore, to  
overcome the aforementioned difficulties in a way that com-  
plies with the safety and railway standards, through a de-  
35 vice with which it is possible to regulate the substructure

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of the ballast, at the time the latter is being renewed and, contemporaneously, to achieve a degree of finish that is sufficiently high to permit rolling stock to transit, at a decent speed, over the said section of the track that  
5 has just been subjected to maintenance but which does not require additional follow-up apparatus since, using extremely simple methods, the machine utilizes the device in question for this purpose.

10 This and other objects too are all attained with the device according to the invention, coupled to a riddling machine provided with a main digging channel for removing the metalling from the ballast and conveying it to a screening/distributing group for the realization of a fresh substructure  
15 of ballast, characterized by the fact that it comprises: an endless chain, equipped with a plurality of claws, this sliding partially in the inside of a guide channel that is placed, over a given distance, transversely to the rails, underneath the substructure of the sleepers and downstream  
20 of the said digging channel with respect to the movement direction of the machine, the said guide channel having, bilaterally and symmetrically with respect to the vertical plane defined longitudinally by the movement direction, two sections that slope on to a vertical plane and converge in  
25 a horizontal plane towards the axis of the machine, the said sections being provided, in the region of the verticality at the extremity of the sleepers, with an aperture for the discharge on to the latter of part of the metalling conveyed by the chain, the said device comprising, moreover,  
30 a conveyor, placed horizontally, transversely with respect to the rails, underneath the extremities of the said converging sections of the guide channel, this being designed to accept the remainder of the metalling conveyed by the chain and to discharge it laterally with respect to the  
35 machine.

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In one preferred form of embodiment, the said conveyor is of a length at least equal to the gauge of the track and it slides with a movement direction that is in harmony with the one followed by the chain.

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The advantage the said device offers consists in the fact that the ballast is levelled and that the excess metalling is distributed on to the lateral extremities of the sleepers, thereby creating a renewed ballast over which rolling stock is able to pass at an adequate speed.

10

Further characteristics and advantages of the invention in question will emerge more obviously from the detailed description that follows of one preferred but not sole form of embodiment for the invention, illustrated purely as an unlimited example on the accompanying drawings, in which:

15

Figure 1 shows, in a lateral diagrammatic view with certain parts removed, a riddling-levelling machine, on which the regulating device in question is used;

20

Figure 2 shows, diagrammatically in a plan view, the device depicted in Figure 1.

With reference to the accompanying drawings, shown globally at (1) is a riddling-levelling machine hauled by a locomotive that is not depicted in Figure 1 but is positioned to the extreme left thereof. The machine has a frame (3), sustained at the rear by a bogie (4), that is provided with a digging channel (5) carrying a non-illustrated chain, the front section (5') of which extends transversely to the track, destined to remove the metalling from the ballast (M) to be renewed and to channel it above a non-illustrated conveyor belt which, in turn, takes it to a riddle. This, after having rejected pieces of an unsuitable size, distributes the screened, and eventually reintegrated, metalling,

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via a hopper (7) placed downstream of the said channel (5), partly on the track in between the rails so as to create a fresh ballast substructure, and partly outside the rails, in the region of the ends of the sleepers, so as to guarantee greater stability on the part of the latter.

Although the sleepers (T) are rested afresh above this new ballast, the problem does exist, however, of the upper surface of the ballast (on which the sleepers are laid) being, following the action taken solely by the channel (5), uneven due to physical variations in the supporting ground and to differences in the redistribution of the said ballast.

In this connection, use is made of the device in question, placed downstream of the said channel (5) and of the said hopper (7), which comprises an endless chain (10), equipped with a plurality of claws (11) for laying hold of and conveying the metalling, so placed that it slides partially inside a guide channel (12) under the action of a motor (13). The said guide channel has a horizontal section (20), placed transversely to the rails underneath the substructure (P) of the sleepers, of a width greater than the length of the latter, and at a height that is generally above that of the digging channel (5) but can be varied by a pair of hydraulic cylinders (14) fixed by the body to the frame of the machine, with the rod on the lateral sections of the guide chain. The said sections (12') and (12''), pivotally connected at (21) to the aforementioned horizontal section (20), slope upwards, with respect to a vertical plane, and converge towards the longitudinal axis x-x of the machine, with respect to a horizontal plane. Below the said oblique sections (12') and (12'') in the region of the verticality at the extremity of the sleepers outside the track, each channel is provided with a metalling discharge trap-door (15), the area of which is less than that of the channel itself,

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wherein the extent of the opening can be varied by means of a shutter; the two channels meet in the region of their terminal part close to the vertex (V) and discharge the remainder of the metalling into an underneath hopper (16)

5 whose lower part opens on to a horizontal conveyor belt (17) that extends transversely above the track and is of a length at least equal to the gauge of the railway.

The said conveyor belt (17) is movable in the two directions,  
10 operated by a motor (18), similarly to the chain (10).

The operation of the device forming the subject of the invention is very simple: placed at a level higher than that of the digging channel (5), it flattens the unevenness in  
15 the fresh ballast formed by the hopper upstream of the device itself. The said unevenness is due to the metalling in the new ballast being distributed in a different fashion.

The metalling thus picked up by the chain (10), which can  
20 be supposed to rotate in an anticlockwise direction (30), is carried by this along the oblique guide channel (12') and is partially discharged, via the corresponding trap-door (15 ), on to the ends of the sleepers on the left, with respect to the movement direction of the machine, while  
25 the remainder is discharged, via the hopper (16), on to the conveyor belt (17) (movable in the direction shown at (31)) and thence on to the righthand ends of the sleepers.

In this way, the dual object is achieved of levelling the  
30 ballast substructure and of anchoring the sleepers (this being indispensable, particularly on bends).

Laterally, at the front of the horizontal section (20) of the guide channel, are placed two flat blades (22) and (23),  
35 respectively, of a height at least equal to that of the



said guide, which are pivoted thereto in an adjustable fashion by means of corresponding cylinders (24) and (25). The first of the said blades, namely the one numbered (22), extends in a virtually vertical plane parallel to the axis  
5 x-x and has the twin task of preventing the material carried by the chain from continuing to move transversely without being charged along the sloping guide (12') or (12'') and of restraining the metalling on the adjacent bank (in cases when there is a double track), stopping it from sliding  
10 along the line where there is the most gradient, coming into contact with the chain and thus being carried along by this.

The second of the said blades, namely the one numbered (23),  
15 has the task, differently from the first blade numbered (22) which can be closed or disengaged, of restraining the metalling laterally outside the area along which the channel (20) passes.

20 As can be seen, the device is symmetrical with respect to the longitudinal axis x-x since the chain (10) can rotate clockwise, and the conveyor belt (17), consequently, in the reverse direction thereto.

25 In its practical form of embodiment, the invention can also adopt forms that differ from what has been described above and, in particular, numerous modifications of a practical nature may be made without in any way deviating from the framework of protection afforded to the invention.

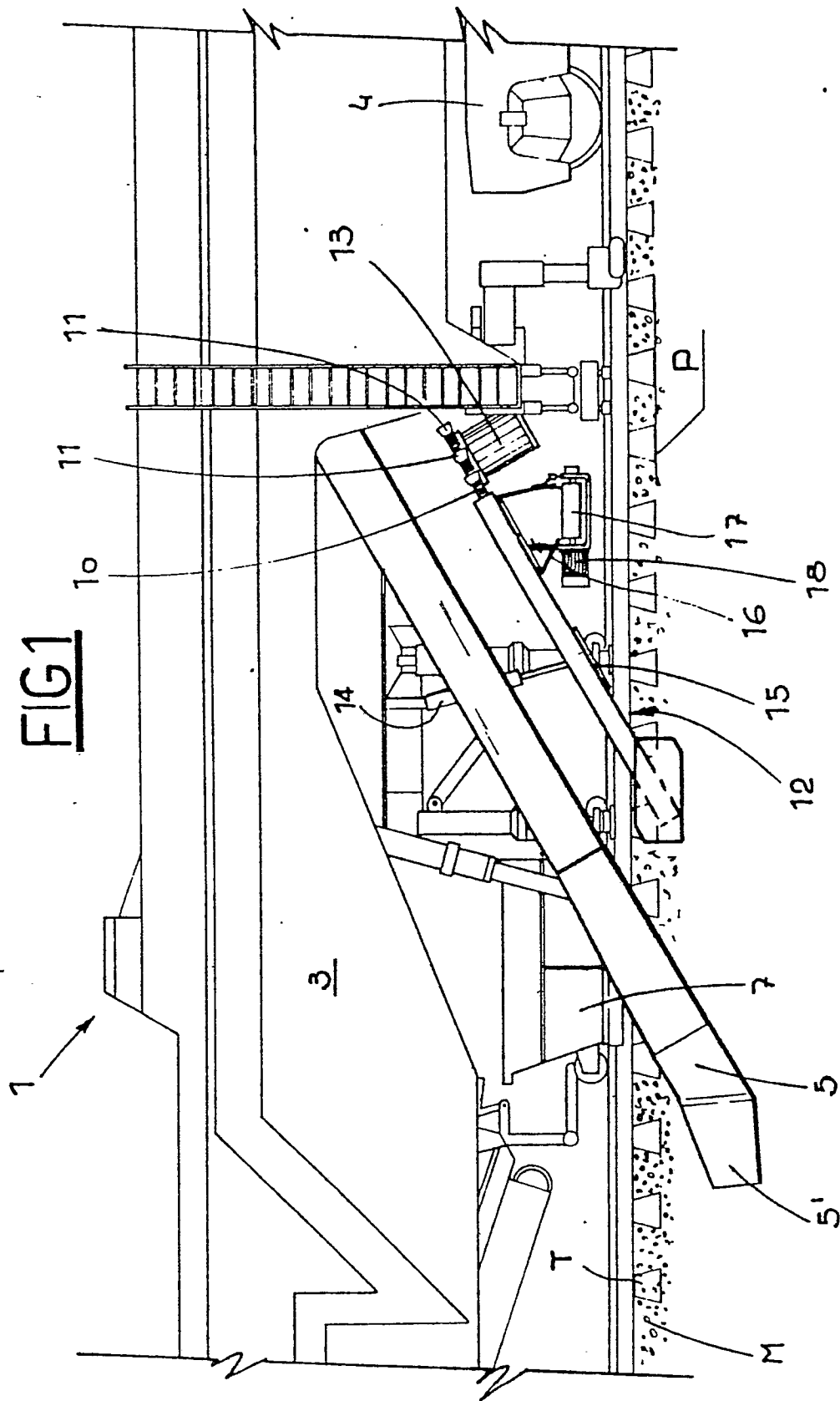
## Claims:

1. Device for regulating the substructure of ballast on railway tracks, coupled to a riddling machine provided with a main digging channel (5) for removing the metalling from the ballast and conveying it to a screening-distributing group for the realization of a fresh substructure of ballast, characterized by the fact that it comprises: an endless chain (10), equipped with a plurality of claws (11), this sliding partially in the inside of a guide channel (12) that is placed, over a given distance (20), transversely to the rails, underneath the substructure of the sleepers and downstream of the said digging channel with respect to the movement direction of the machine, the said guide channel having, bilaterally and symmetrically with respect to the vertical plane defined longitudinally by the movement direction, two sections (12') and (12'') that slope on to a vertical plane towards the axis of the machine, the said sections being provided, in the region of the verticality at the extremity of the sleepers, with an aperture (15) for the discharge on to the latter of part of the metalling conveyed by the chain, the said device comprising, moreover, a conveyor (17), placed horizontally, transversely with respect to the rails, underneath the extremities of the said converging sections of the guide channel, this being designed to accept the remainder of the metalling conveyed by the chain (10) and to discharge it laterally with respect to the machine.

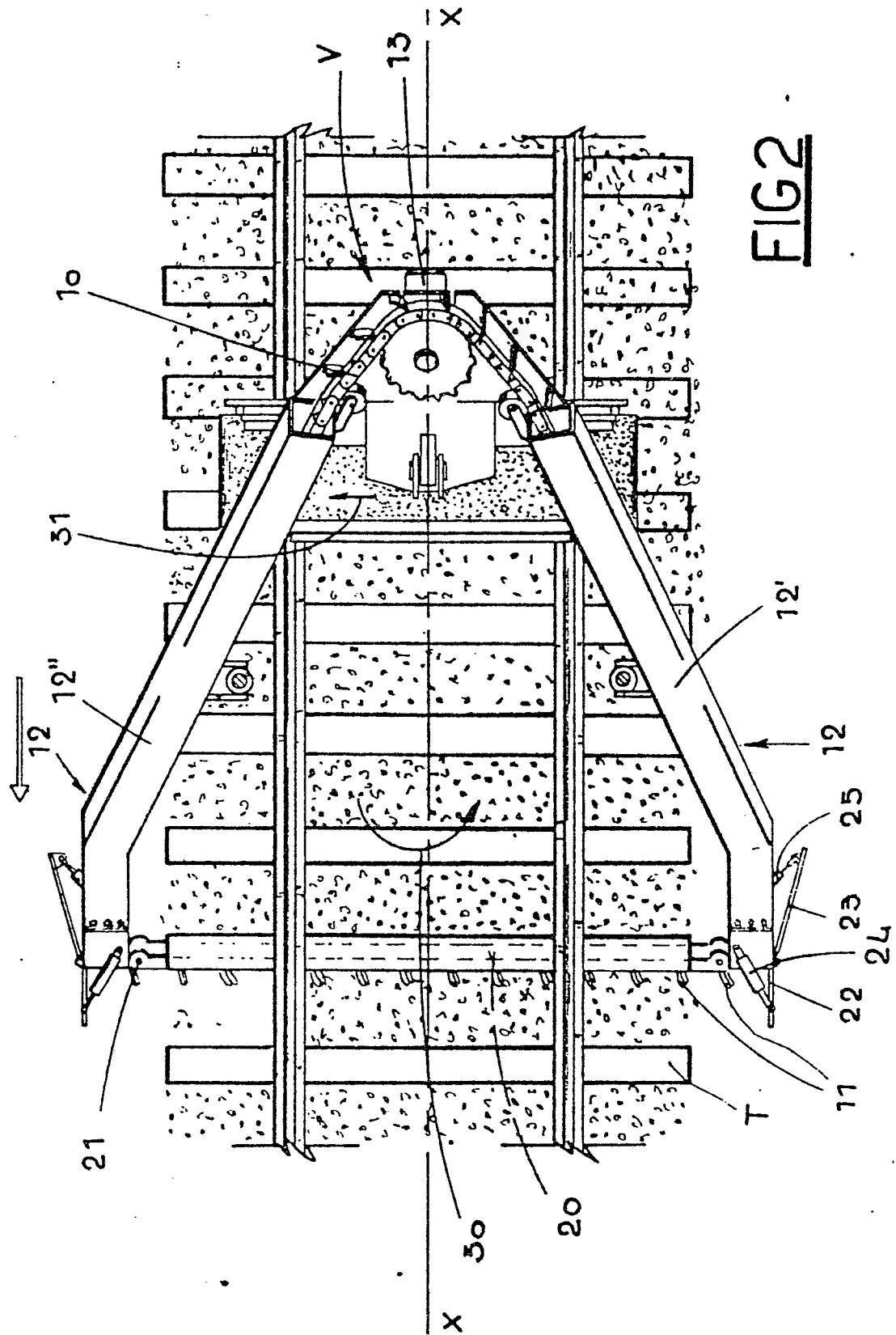
2. Device according to the preceding claim, characterized by the fact that it comprises, bilaterally to the said horizontal section (20) of the said guide channel (12) of the chain (10), two pairs of blades, numbered (22) and (23), of a height at least equal to that of the said channel and pivoted thereto in an adjustable fashion, the former ex-

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tending in a virtually vertical plane parallel to the longitudinal axis of the machine, laterally at the front of the said channel, and the latter extending in a vertical plane, placed obliquely with respect to the movement direction of  
5 the machine, at the side of the said channel and to the rear of the said first pair.



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European Patent  
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# EUROPEAN SEARCH REPORT

0044284

Application number

EP 81 83 0102

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<p><u>FR - E - 47 273/FR - A - 747 941</u> (LEGRAND)</p> <p>* Page 1, left-hand column - paragraph 2; page 2, right-hand column - paragraph 2; page 2, left-hand column - paragraph 2; figures 1-3 *</p> <p>---</p> <p><u>FR - A - 2 339 707</u> (PLASSER)</p> <p>* Page 7, line 38; page 8, lines 1-10, 27-35; figures 1 and 2 *</p> <p>---</p>	1	E 01 B 27/10
A	<p><u>FR - A - 747 941</u> (GUILBERT AND LEGRAND)</p>	1	TECHNICAL FIELDS SEARCHED (Int. Cl.)
A	<p><u>US - A - 3 339 493</u> (BRYAN)</p> <p>-----</p>		E 01 B
			CATEGORY OF CITED DOCUMENTS
			<p>X: particularly relevant</p> <p>A: technological background</p> <p>O: non-written disclosure</p> <p>P: intermediate document</p> <p>T: theory or principle underlying the invention</p> <p>E: conflicting application</p> <p>D: document cited in the application</p> <p>L: citation for other reasons</p>
<p><input checked="" type="checkbox"/> The present search report has been drawn up for all claims</p>			<p>&amp;: member of the same patent family, corresponding document</p>
Place of search		Date of completion of the search	Examiner
The Hague		25-09-1981	RUYMBEKE