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Remarks:
Claims 18-22 are deemed to be abandoned due to non-payment of the claims fees (Rule 45(3) EPC).

(54) **Method and assembly for repaving**

(57) Method for repaving a road surface consisting of paving elements laid in bond, such as a road surface for vehicles or pedestrians, wherein by a lifting force exerted onto the lower side of the elements by supports, successively a number of packages of elements are lifted out of the road surface, while preserving the bond of the elements in each package, the packages while preserving the bond are successively put aside at a distance from the place of origin from the road surface, preferably in stacks of packages, the cleared basis, particularly the sand bed, is profiled, and the packages are successively placed in situ again, while preserving the bond between the elements within the individual packages.

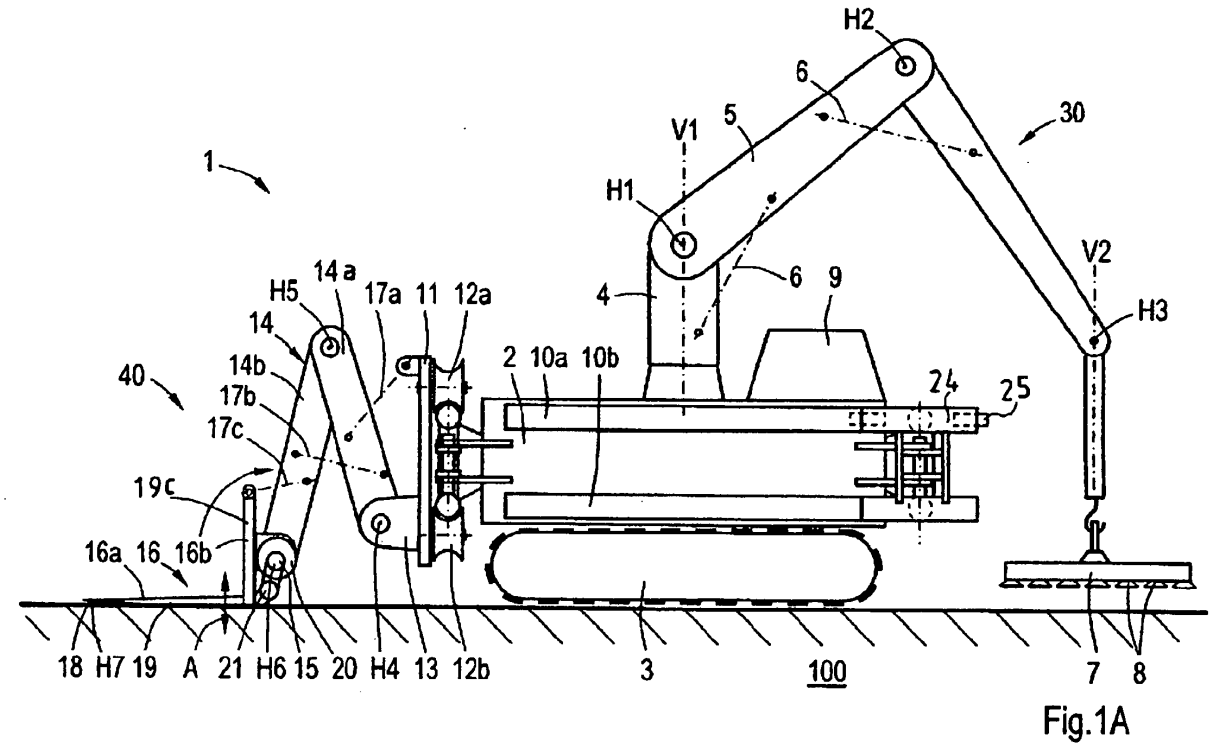

Fig.1A

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Description

BACKGROUND OF THE INVENTION

[0001] The invention relates to a method and assembly or device for repaving pavements consisting of elements, particularly paving bricks. When repaving the elements are taken out of the (road) surface, temporarily stored, and after profiling and optionally raising the (sand) bed are placed back again. The paving bricks can for instance be made of fired clay or of concrete. The elements can also be formed by paving tiles.

[0002] In NL patent 1016464 it was suggested to successively take packages of paving bricks out of the road surface while preserving their bond, to subject them as a package in bond to a vibration for at least slightly cleaning the paving bricks, and after levelling the sand bed to place the package back again. By means of a pick-up device provided with suction cups a package of paving bricks is lifted out of the road surface and transferred to a vibration bed.

[0003] In a road surface to be repaved many paving bricks, for instance in herringbone bond, will sit closely together. This can mainly be the result of the paving bricks tilting towards each other because of settings in the sand bed, which in turn could be a result of local differences in traffic loads, or of settings in the basis below the sand bed. Due to the dense packing, difficulties are experienced when lifting the paving bricks using suction force, which may lead to paving bricks being left behind. They will have to be removed as yet by hand or a tool, and be added to the rest of the package that has been placed on the vibration bed.

SUMMARY OF THE VENTION

[0004] It is an object of the invention to provide a method and assembly/device of the type mentioned in the preamble with which repaving can be carried out in an efficient manner.

[0005] It is an object of the invention to provide a method and assembly/device of the type mentioned in the preamble with which repaving can be carried out in a reliable manner.

[0006] It is an object of the invention to provide a method and assembly/device of the type mentioned in the preamble with which repaving can be carried out in compliance with the Health and Safety Act.

[0007] For achieving at least one of these objects the invention, according to one aspect, provides a method for repaving a road surface consisting of paving elements laid in bond, such as a road surface for vehicles or pedestrians, wherein by a lifting force exerted onto the lower side of the elements by a lifting device with a support or supports, successively a number of packages of elements are lifted out of the road surface, while preserving the bond of the elements in each package, the packages while preserving the bond are successively put aside at a distance from the place of origin from the road surface, preferably in stacks of packages, the cleared basis, particularly the sand bed, is profiled and/or raised, and the packages are successively placed in situ again, while preserving the bond between the elements within the individual packages. In that way all elements of the package can be removed simultaneously, in bond, so that the risk of elements being left behind on the sand bed is minimised. The packages remain in their original layout, suitable fore replacement, so that the number of actions can remain limited.

[0008] The supports may for instance be formed by a loading surface of a suitable shovel. It is noted that in NL 1016464 removing the paving bricks from an existing paving using a shovel is indeed mentioned, but this is done in the usual way, wherein the paving bricks are urged into the loading bin of the shovel in mutually random positions, like a pile. The bond is thus broken and will have to be created again.

[0009] The supports may be provided with a jig adapted to the edge of the package to be removed. The jig may for instance form a herringbone edge. The jig may be replaced by another jig adapted to another size of element or to another type of bond. The jig may face the direction in which the supports are moved under the package to be taken and thus form a profiled abutment for the elements of the package.

[0010] In order to be able to place the package of elements properly later on, the elements, as known per se, can be subjected to a vibration treatment. As opposed to the known process, the package of elements when it is fully taken up by the supports, particularly after having been lifted over a certain distance with respect to its basis, is set into vibration, particularly with the upper surfaces of the elements in a horizontal plane. Advantageously the package of elements can be set into vibration by vibration of the supports for the lower side of the elements, particularly in substantially vertical direction. In that way the support has two functions and while preserving the bond, the fact that the elements have already been engaged is utilised for vibration. The supports can allow sand to pass through, particularly form a grid, such as with bars. The supports may for instance be part of a type of vibration tray, as known per se, optionally with some adaptations. A vibration tray is for instance described in WO 90/12929.

[0011] It is noted that from Dutch patent application 90.01291 it is known per se to take out a package of paving bricks from a road surface using a fork plate and to set the fork plate into vibration during sliding the fork plate under said package. In this case it is possible that the paving bricks on the fork plate vibrate out of bond, particularly the paving bricks in the row that was first taken up. The packages of paving bricks removed from the road surface can be placed by the fork plate on a pallet or storage fork, that is disposed on the same frame as the fork plate. Also during transport on the pallet the fork plate is set into vibration.

[0012] Subjecting the package on the support to the vibration according to the invention preferably takes place when the package is at least substantially straight above the initial basis of said package. The dislodged sand then falls through the support back onto the sand bed. The said certain distance preferably is smaller than the height of an element, preferably approximately half its height to three quarters of its height. In that way during vibration use can be made of the adjacent elements that are still in situ and sidewardly confine the elements set into vibration, should this be necessary. In that way according to the invention during vibration at least some of the packages on at least one side, preferably on two sides, preferably sides that connect to each other, optionally on three sides, can be bounded by elements that are still in the road surface.

[0013] In a further development of the method according to the invention the package of elements after having been lifted out of the road surface is taken over by a displacer that engages the elements at the upper side and puts the package aside. The displacer, which in a manner known per se is able to engage the elements using suction force, or alternatively is able to engage on the sides of the package using clamping force, is able to put the package reliably on a basis, while preserving the bond. The elements need not be slid from the supports. Moreover the supports themselves need not be taken exactly to the location where the elements are put aside.

[0014] The displacer can also be used for placing the package back in situ again.

[0015] The dimensions of the package may for instance be 1 m to 2m by 1 m to 2m. The road surface will usually have a width that is a multiple of the width of the package.

[0016] According to a further aspect the invention provides an assembly for moving a package of paving elements that are placed in a mutual bond, comprising a frame with disposed thereon a lifting device having a support, particularly a support designed like a loading slide, for the lower side of the package, first movement means for vertically moving the lifting device with respect to the frame, second movement means for horizontally moving the lifting device, and, differing from the lifting device, a displacement device for the package provided with a pick-up device, which pick-up device is particularly provided with suction cups for the elements, for picking up the package from the support, and with third movement means for moving the pick-up device from a pick-up position near the lifting device to a position remote therefrom for putting aside the package picked up from the support. The lifting device can be slid under the package of elements by the first and second movement means and then be lifted. With the displacement device the package can be taken over from the lifting device and be put aside on a location for that purpose and later on be taken from there to be placed back in situ again.

[0017] In a further development the lifting device is provided with vibration means for letting the support vibrate. The vibration means can subject the support, or at least a part thereof, to a vertical vibratory motion. The support can allow sand to pass through, particularly form a grid, such as with bars.

[0018] The second movement means can be provided with means for moving the lifting means away from the frame and towards it again. During said motion the frame itself can remain stationary.

[0019] In a further development the frame comprises a horizontal guide for the lifting device, which guide extends over at least a part of the circumference of the frame, preferably extends on all sides of the frame, particularly around the frame, and is furthermore provided with fourth movement means for moving the lifting device along the guide.

[0020] At the location of at least one corner of the frame the guide can be interrupted and in that case at that location be provided with a transfer device for moving the lifting device from the guide on the one side connected to the corner to the guide on the other side connected to the corner. The transfer device can be movable between a position in line with the guide on the one said side and a position in line with the guide on the other said side. In that way the effective active length of the guides can be increased and thus also the effective range of the lifting device.

[0021] In a compact embodiment the frame forms a unit that can be manoeuvred as one unity, wherein also the displacement device is disposed on the frame.

[0022] According to a further aspect the invention provides a method for repaving a road surface consisting of paving elements laid in bond, such as a road surface for vehicles or pedestrians, wherein successively a number of packages of elements, while preserving the bond of the elements in each package, are lifted out of the road surface by a lifting device and with said same lifting device the elements of the package in question are set into vibration, while preserving the bond in the package in question. **In** that way the lifting device has two functions and, while preserving the bond, the fact that the elements have already been engaged is used for the vibration.

[0023] In addition, as already stated above, the lifting device can lift the package by engagement of the lower side of the elements of the package.

[0024] In one embodiment the elements are set into vibration above a cleared section of the basis for the paving, particularly above the section from which they themselves were lifted. The dislodged sand then falls back onto the sand bed.

[0025] In this case as well, for the reasons stated above, it is advantageous if the elements are set into vibration prior to the package having been lifted to above the upper surface of the paving, preferably when the package has been lifted to approximately half to three quarters of the height of an element.

[0026] The aspects and measures described in this description and the claims of the application and/or shown in the drawings of this application may where pos-

sible also be used individually. Said individual aspects may be the subject of divisional patent applications relating thereto. This particularly applies to the measures and aspects that are described per se in the sub claims.

SHORT DESCRIPTION OF THE DRAWINGS

[0027] The invention will be elucidated on the basis of an exemplary embodiment shown schematically in the attached drawings, in which:

Figures 1A and 1B show a side view and a top view, respectively, of an exemplary embodiment of a device according to the invention;

Figures 2A-F show partial side views of stages in the use of the device of figures 1A, B; and

Figure 3A-E show top views of some steps in the use of the device of figures 1A, B.

DETAILED DESCRIPTION OF THE DRAWINGS

[0028] The assembly 1 of figures 1A and 1B is an assembly of two devices, namely a displacement device 30 and a lifting device 40. Both devices 30, 40 are attached to one and the same frame 2, which by driven caterpillar tracks 3 supports on a basis 100. Placed on the frame is an operating room 9 from which both devices 30, 40 and propelling the frame 2 can be controlled. Furthermore present is a remote control that is not shown for one or both devices and/or for propelling the frame 2.

[0029] The displacement device 30 comprises a column 4 extending upwards from the frame, on which column a hydraulic boom 5 is attached. With means that are not shown, the column 4 can be rotated about a vertical centre line V1 and the boom is 5 is divided, wherein between mutual boom members and between boom 5 and column 4 cylinders 6 are provided with which the mutual angles in the vertical plane between column 4 and boom members can be set. At the lower end of the boom 5 a paving brick pick-up device 7 with suction cups 8, known per se, is suspended. For operating the suction cups 8 pneumatic means, such as a vacuum source and lines, are present on the frame 2 and along the boom 5, however they are not shown. In the drawing the vertical (V) and horizontal (H) centre lines around which rotation can take place are shown, see V1, V2, H1, H2, H3. The boom 5 can be moved such that the pick-up device 7/8 can be operational on each side of the frame 2.

[0030] The lifting device 30 comprises a carriage 11, which with wheels 12a,b (driven by a motor that is not shown) is supported on rails 10a,b arranged at the circumference of the frame 2. The carriage 11 carries a bracket 13 for a divided boom 14, of which the two members 14a,b are mutually connected by a hydraulic cylinder 17b, with which the mutual angle in the vertical plane can be set. Furthermore a hydraulic cylinder 17a is present between boom member 14a and the upper side of the carriage 11, for setting the angle of boom member 14a. At the outer end of the boom 14 at the location of a bracket 15 an L-shaped slide 16 is arranged in a hinging manner, comprising a horizontal leg 16a and an upright leg 16b. The angle between the slide 16 and the boom member 14b can be set by two hydraulic cylinders 17c situated on both sides of the boom member 14b. Near the lower end of upright leg 16b, that can be formed by bars 19c, a shaft 21 driven by a motor 20 is provided. The horizontal leg 16a comprises a number of parallel bars 19, a number of which (19b) are permanent and rods 19a situated in between them are connected so as to hinge (H7) with the rear side of the sharp front edge 18. At their other end the bars 19a are connected to the shaft 21 by means of eccentric bearings. As a result thereof when operating the motor 20 an up-and-down (vibratory or shaking) motion (A) will be carried out by the rear end of the bars 19a, with horizontal centre line H7 as centre of rotation. The other horizontal rotary centre lines H4, H5, H6 are also schematically shown.

[0031] As can be seen in the top view of figure 1B, rails 10a,b are arranged on all sides of the frame 2. They extend to near the corners, where on fixed brackets 22 transfer rails 24 are provided that are tiltable (B) over 90 degrees about hinges 23 with vertical rotary centre line. The transfer rails 24 can be coupled to the rails 10a,b by means of sleeve couplings 25, all this such that the wheels 12a,b of the carriage 11 can be driven from the rails 10a,b onto the transfer rails 24 and back again. When the carriage 11 has to be moved to another side, the carriage 11 is driven onto the transfer rails 24, the transfer rails 24 are tilted (B) over 90 degrees, and the carriage 11 is driven from the transfer rails 24 onto the rails 10a,b situated on the next side. It can be seen that when the transfer rails 24 are in line with a guide 10a the effective range of the carriage 11 and thus the lifting device 30 is increased.

[0032] The slide 16 can be provided with a jig 30 that is schematically shown in a slightly enlarged manner, which over the range of the bars 19a can be attached to for instance the upright leg 16b and as regards profile can be adjusted to a herringbone bond of the package of paving bricks to be removed. If the paving bricks have a different size or the bond is different, another jig adapted thereto can be attached to the slide 16.

[0033] In figures 2A-F a few consecutive steps in the process of removing paving brick packages from a road surface are illustrated. In figure 2A the assembly 1 is supported on a sand bed 100, on which (left hand side) a paving of paving bricks 200 to be removed sits. The sand bed 100 will initially be locally cleared by breaking out a limited surface of paving bricks by hand or using a shovel, sufficient for at least moving the horizontal slide leg 16a easily underneath a package to be lifted. In figures 2A-F an already larger surface has been cleared, so that the frame 2 also supports on the sand bed 100. For repaving after reprofiling the sand bed 100, the same

paving bricks will be used, for which purpose the packages of paving bricks in permanent bond, in this case herringbone bond, are temporarily put aside.

[0034] The slide 16 is extended just over the sand bed 100 towards the paving brick paving, direction C, by operating the cylinders 17a,b and/or movement of the frame 2, direction D. The slide leg 16a is in that case tilted slightly forward, in this case for reasons of illustration at an exaggerated angle; it is desirable that the angle is as small as possible, wherein the slide leg 16a with the lower surface situated near the lower end of the slide leg 16b will be in contact with the sand bed. The sharp front edge 18 slides along the lower side of the paving bricks until a paving brick package 201 of the wanted dimensions, suitable to be sufficiently stably supported on the slide leg 16a, see figure 2B, has been engaged. The said jig 30 then fittingly abuts the package edge that faces the frame 2. Due to the wedge shape of the slide leg 16a the paving bricks slide onto the slide leg 16a, wherein the package 201 is situated slightly inclined. Subsequently the cylinder 17c is operated in order to tilt the slide 16 rearwards such about H6, direction E, that the slide leg 16a with the support surface for the paving bricks is horizontal again and thus the package of paving bricks 201 as well (figure 2C, in which the frame has come closer again, direction D). Optionally after a slight vertical displacement of the slide 16 with package 201 as a whole, direction P, it is ensured that the package 201 with the lower side is still below the level of the upper side of the connecting paving bricks 200 that are still on the sand bed. The indicated distance h between the upper sides of the paving bricks 200 and package 201 is smaller than the paving brick height, preferably approximately half to three quarters thereof.

[0035] Then the motor 20 is operated for the first time and the bars 19a carry out a substantially vertical vibratory or shaking motion, directions A (figure 2D), wherein the bars 19b situated between the bars 19a remain stationary. The amplitude of the vibratory or shaking motion can be small, for instance 1 cm, in any case sufficient to dislodge an excess of clinging sand to the paving bricks of the package 201. Said sand can then fall between the bars 19 onto the sand bed 100. The paving bricks 200 that are still on the sand bed and said jig 30 can prevent that the paving bricks of the package 200 move from the slide leg 16a as a result of the vibratory motion.

[0036] After vibration/shaking, the package 201 can be removed from the slide 16, for which purpose the boom 5 is operated to bring the pick-up device 7/8 over the package 201 and lower it, just along the jig 30, direction F (figure 2E). The suction cups 8 are brought into engagement with the upper sides of the paving bricks of the package 201 and by operating the suction cups 8 are sucked onto using vacuum, and then, figure 2F, simultaneously lifted as a package from the slide 16, direction G. The boom 5 is then rotated about centre line V1 to bring the pick-up device 7/8 over a sidewalk, where the package 201 can be put down. The cycle discussed here can then be repeated for next packages.

[0037] In figures 3A-D a number of the steps discussed above is shown in top view. Figures 3A-C substantially correspond with the situations shown in figures 2A, 2B and 2D, respectively, however with the frame 2 supporting on a paving. In figure 3D after the situation of figure 2F the start has been made with a swinging motion direction K of the boom 5 to be able to place the package 201 on the sidewalk 301 bounded by kerbstones 300. The paving 200 is thus divided into packages 201 of paving bricks that still remain in bond, which packages 201 remain stacked on the sidewalk 301 until the sand bed has be reprofiled and/or raised (and optionally other activities have been carried out, such as regarding piping installation).

[0038] After the work on the sand bed has been completed the paving can be laid again using the packages 201. As shown in figure 3E the assembly 1 then is supported on the paving 200 that has been left behind or that has already been laid. The packages 201 are picked up one by one from the sidewalk and swung (direction J) by the boom 5 and the pick-up device 7/8 to just over the sand bed 100, and then lowered in fitting connection to the packages already placed on the sand bed. The suction cups 8 then release the paving bricks, and a next package 201 will be picked up from the sidewalk 301.

[0039] The above description is included to illustrate the operation of preferred embodiments of the invention and not to limit the scope of the invention. Starting from the above explanation many variations that fall within the spirit and scope of the present invention will be evident to an expert.

Claims

1. Method for repaving a road surface consisting of paving elements laid in bond, such as a road surface for vehicles or pedestrians, wherein by a lifting force exerted onto the lower side of the elements by a support or supports, successively a number of packages of elements are lifted out of the road surface, while preserving the bond of the elements in each package, the packages while preserving the bond are successively put aside at a distance from the place of origin from the road surface, preferably in stacks of packages, the cleared basis, particularly the sand bed, is profiled, and the packages are successively placed in situ again, while preserving the bond between the elements within the individual packages.

2. Method according to claim 1, wherein the package of elements when it is fully taken up by the support (s), particularly after having been lifted over a certain distance with respect to its basis is set into vibration, particularly with the upper surfaces of the elements of the package in a horizontal plane.

3. Method according to claim 2, wherein the package of elements is set into vibration by vibration, particularly in substantially vertical direction, of the support (s) for the lower side of the elements.

4. Method according to claim 2 or 3, wherein subjecting the package on the support to the vibration takes place when the package is at least substantially straight above the initial basis of said package.

5. Method according to claim 2, 3 or 4, wherein the certain distance is smaller than the height of an element, preferably approximately half its height to three quarters of its height.

6. Method according to any one of the preceding claims, wherein the support(s) are slid in horizontal direction underneath the package to be lifted.

7. Method according to any one of the preceding claims, wherein the supports are provided with a jig adapted to the edge of the package to be removed, such as a herringbone edge, wherein the jig in case of claim 6 preferably faces the package in slide direction, wherein the jig preferably can be replaced by another jig adapted to another size of element or to another type of bond.

8. Method according to any one of the preceding claims, wherein during vibration at least some of the packages on at least one side, preferably on two sides, preferably sides that connect to each other, are bounded by elements that are still in the road surface.

9. Method according to any one of the preceding claims, wherein the package of elements after having been lifted out of the road surface is taken over by a displacer that engages the elements at the upper side, particularly using suction force, and puts the package aside, wherein preferably the package is placed in situ again by the displacer.

10. Method according to any one of the preceding claims, wherein the road surface has a width that is a multiple of the width of the package.

11. Assembly for moving a package of paving elements that are placed in a mutual bond, comprising a frame with disposed thereon a lifting device having a support, particularly a support designed like a loading slide, for the lower side of the package, first movement means for vertically moving the lifting device with respect to the frame, second movement means for horizontally moving the lifting device, and, differing from the lifting device, a displacement device for the package provided with a pick-up device, particularly provided with suction cups for the elements, for picking up the package from the support, and with third movement means for moving the pick-up device from a pick-up position near the lifting device to a position remote therefrom for putting aside the package picked up from the support.

12. Assembly according to claim 11, wherein the lifting device is provided with vibration means for letting the support vibrate, wherein preferably, the vibration means subject the support, or at least a part thereof, to a vertical vibratory motion, wherein the support is particularly adapted to allow sand to pass through, particularly forms a grid, such as with bars.

13. Assembly according to claim 11 or 12, wherein the second movement means are provided with means for moving the lifting means away from the frame and towards it again.

14. Assembly according to claim 11, 12 or 13, wherein the frame comprises a horizontal guide for the lifting device, which guide extends over at least a part of the circumference of the frame, preferably extends on all sides of the frame, particularly around the frame, furthermore provided with fourth movement means for moving the lifting device along the guide.

15. Assembly according to any one of the claims 11-14, wherein at the location of at least one corner of the frame the guide is interrupted and at that location is provided with a transfer device for moving the lifting device from the guide on the one side connected to the corner to the guide on the other side connected to the corner, wherein the transfer device is movable between a position in line with the guide on the one said side and a position in line with the guide on the other said side.

16. Assembly according to any one of the claims 11-15, wherein the frame forms a unit that can be manoeuvred as one unity, wherein also the displacement device is disposed on the frame.

17. Assembly according to any one of the claims 11-16, wherein the support is provided with a jig adapted to the edge of the package to be removed, such as herringbone edge, wherein the jig preferably faces a direction away from the frame, wherein the jig preferably is replaceable by another jig adapted to another size of element or to a different type of bond.

18. Method for repaving a road surface consisting of paving elements laid in bond, such as a road surface for vehicles or pedestrians, wherein successively a number of packages of elements, while preserving the bond of the elements in each package, are lifted out of the road surface by a lifting device and with said same lifting device the elements of the package

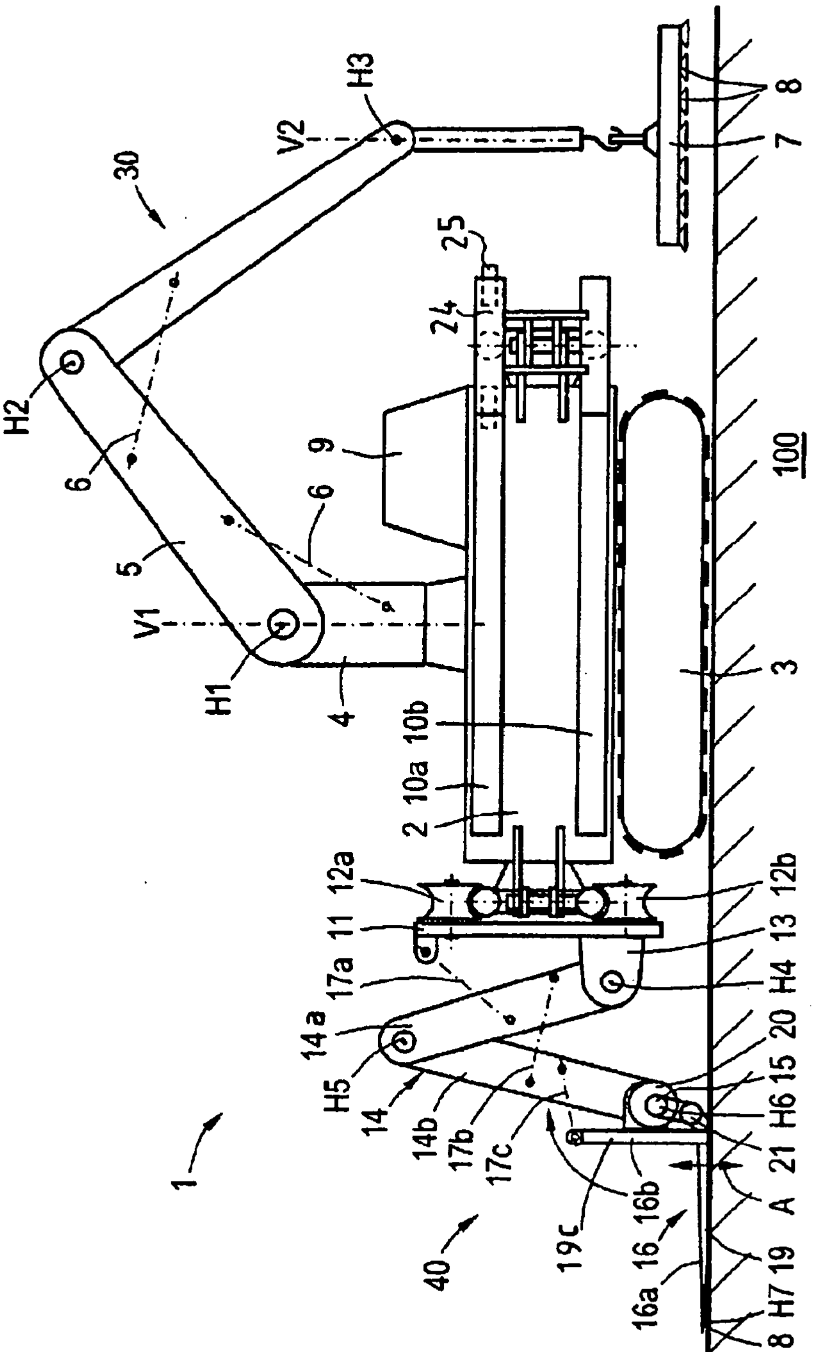
in question are set into vibration, while preserving the bond in the package in question.

19. Method according to claim 18, wherein the lifting device lifts the package by engagement of the lower side of the elements of the package.

20. Method according to claim 18 or 19, wherein the elements are set into vibration above a cleared section of the basis for the paving, particularly above the section from which they themselves were lifted.

21. Method according to claim 18, 19 or 20, wherein the elements are set into vibration prior to the package having been lifted to above the upper surface of the paving, preferably when the package has been lifted to approximately half to three quarters of the height of an element.

22. Method according to any one of the claims 1-10 or 18-21, carried out using an assembly according to any one of the claims 11-17.



H1
H2
H3
H4
H5
H6
H7
V1
V2
30
40
1
2
3
4
5
6
7
8
9
10a
10b
11
12a
12b
13
14
14a
14b
15
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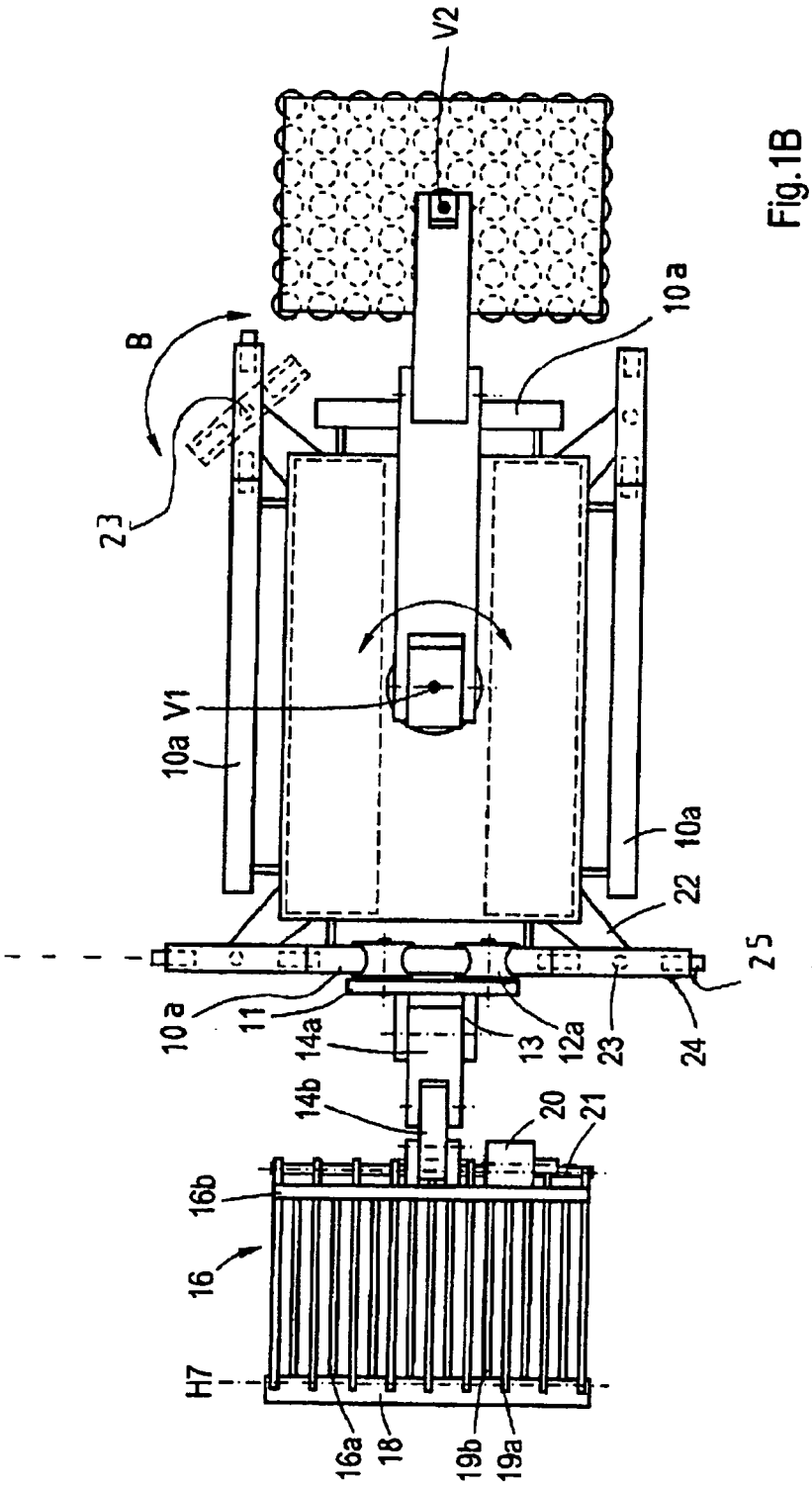
Fig.1A


V2
B
23
10a
10a V1
10a
22
25
10a
11
14a
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12a
23
24
14b
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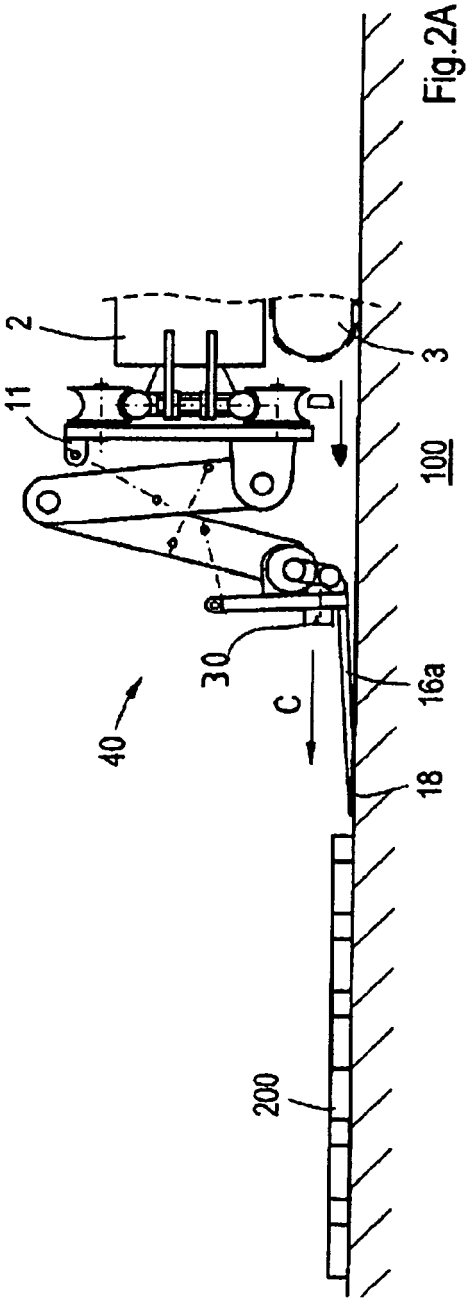
16b
16
H7
16a
18
19b
19a

Fig.1B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C
16a
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18
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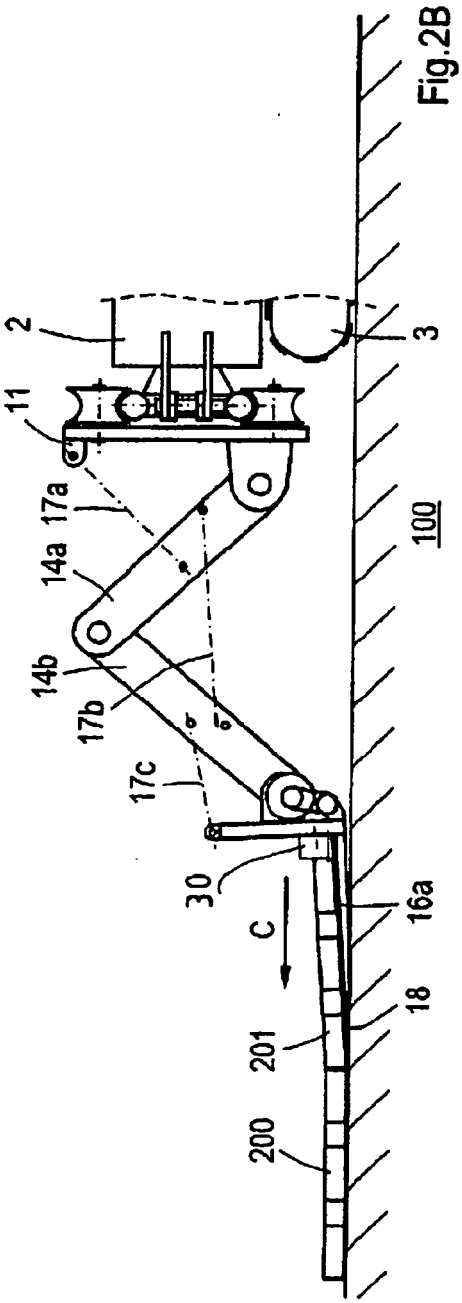
Fig.2A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17c
30
C
16a
18
201
200

Fig.2B

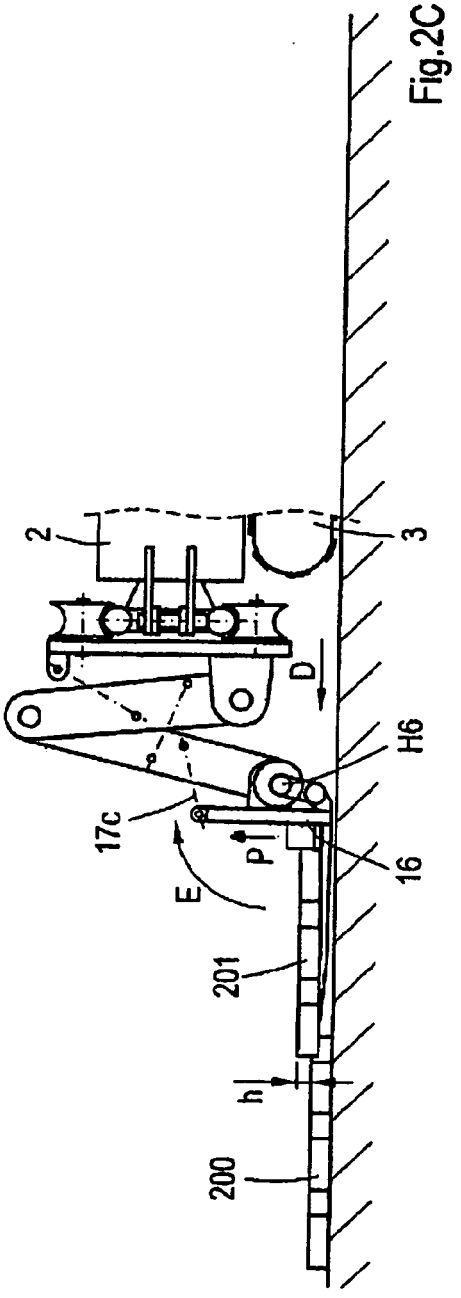

Fig.2C

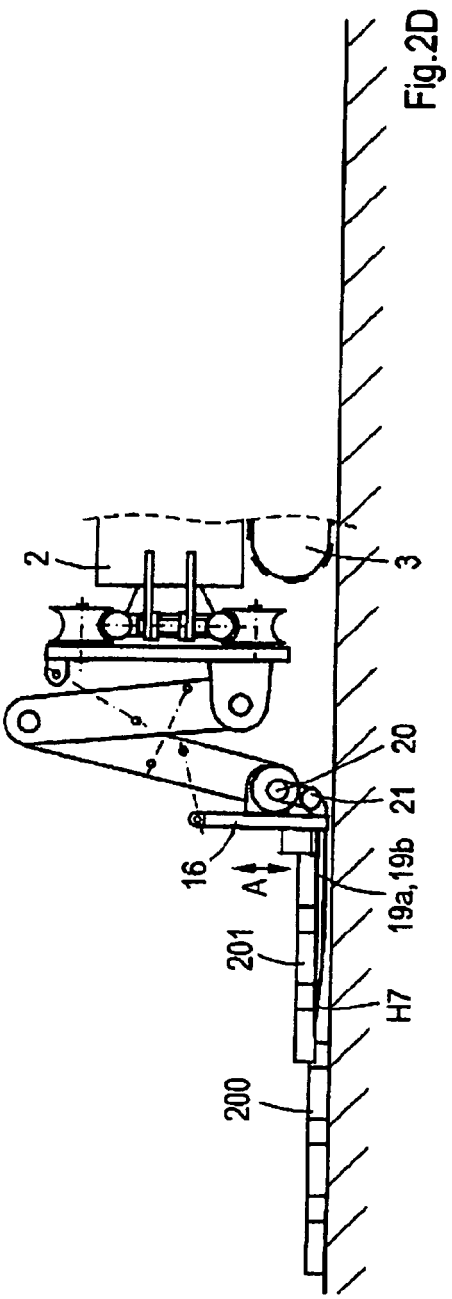

Fig.2D

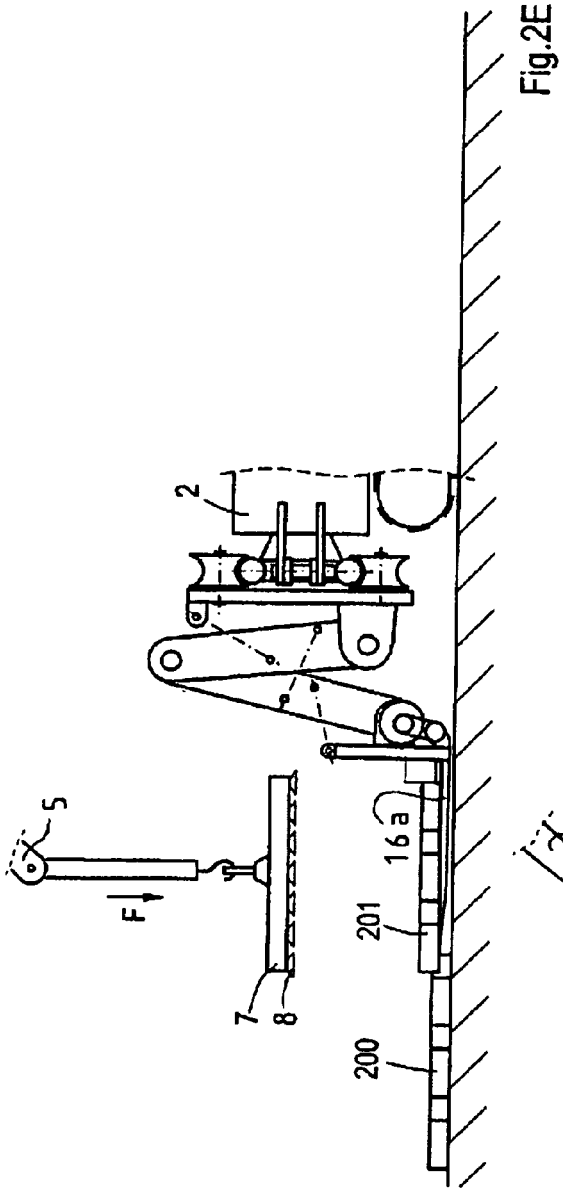

Fig.2E

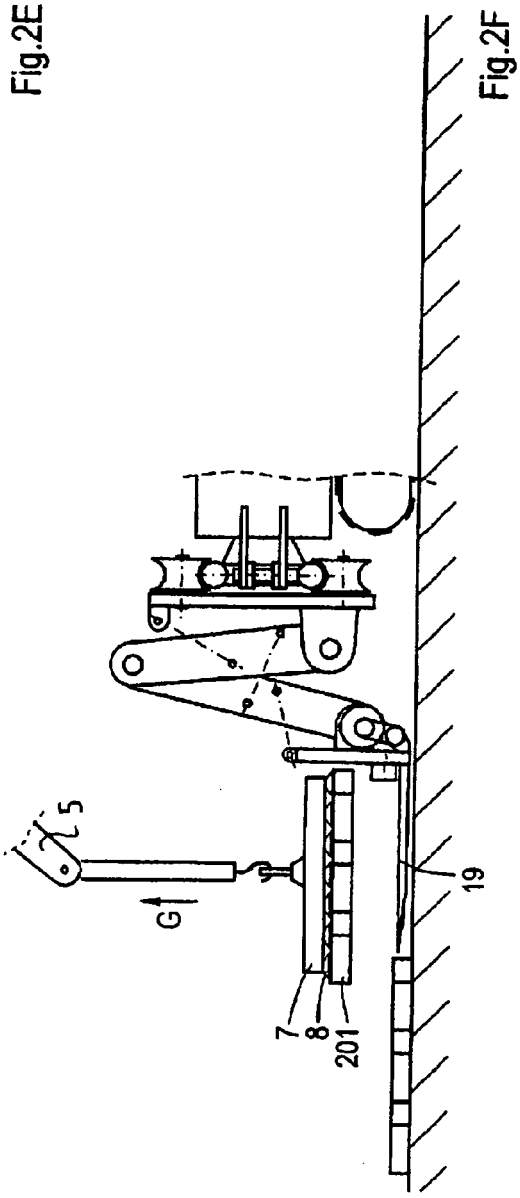

Fig.2F

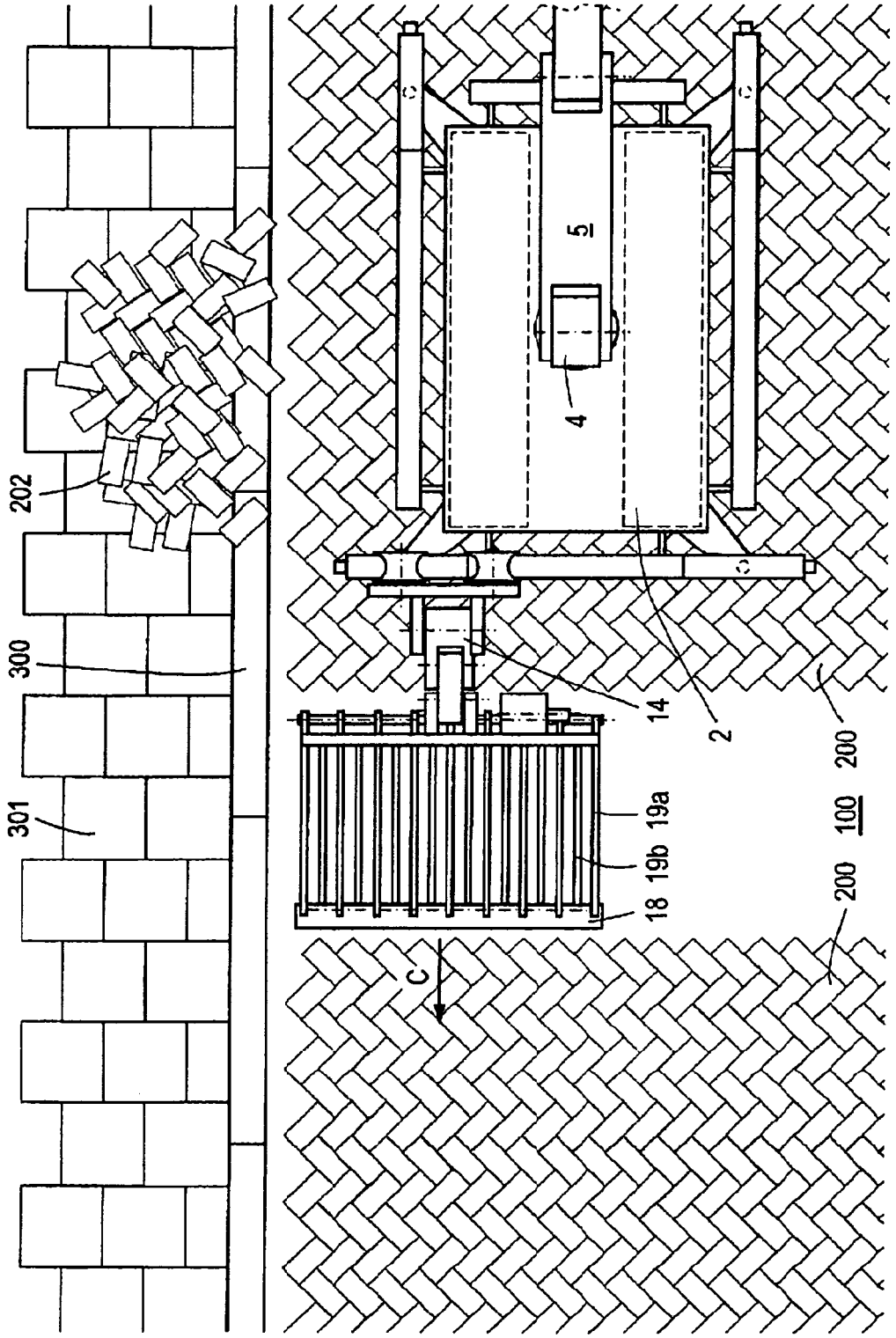

Fig.3A

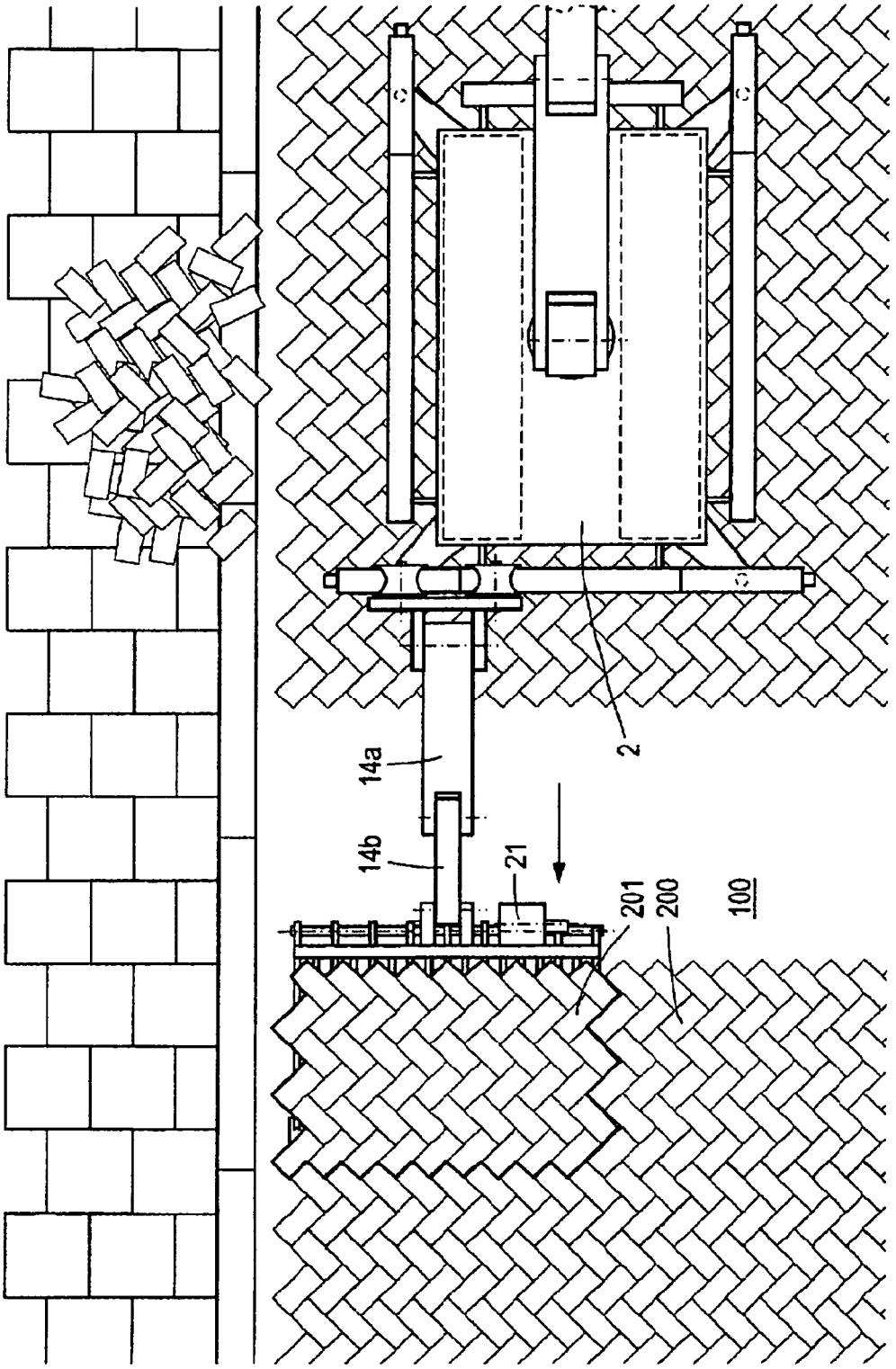

Fig.3B

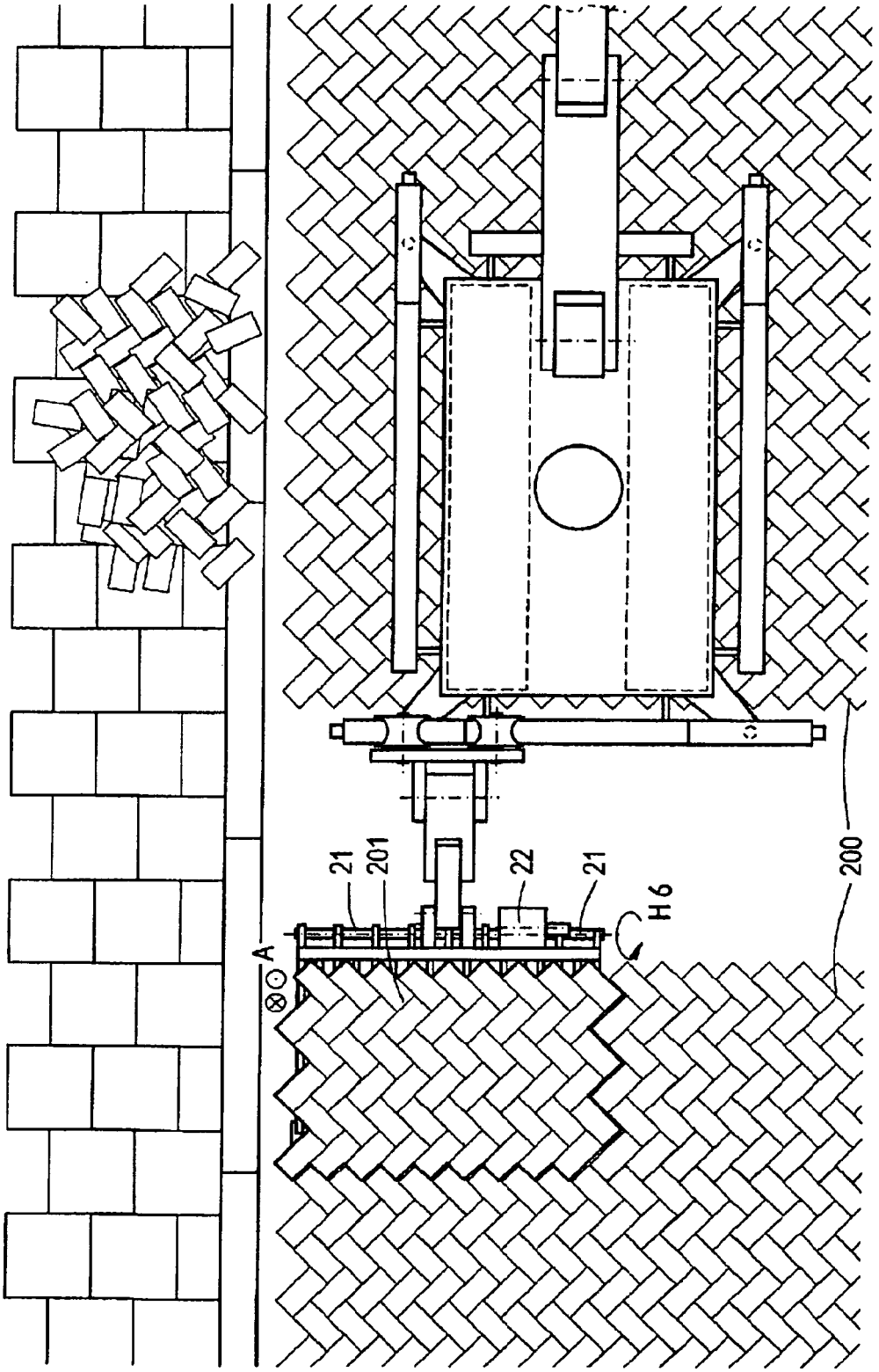

Fig.3C

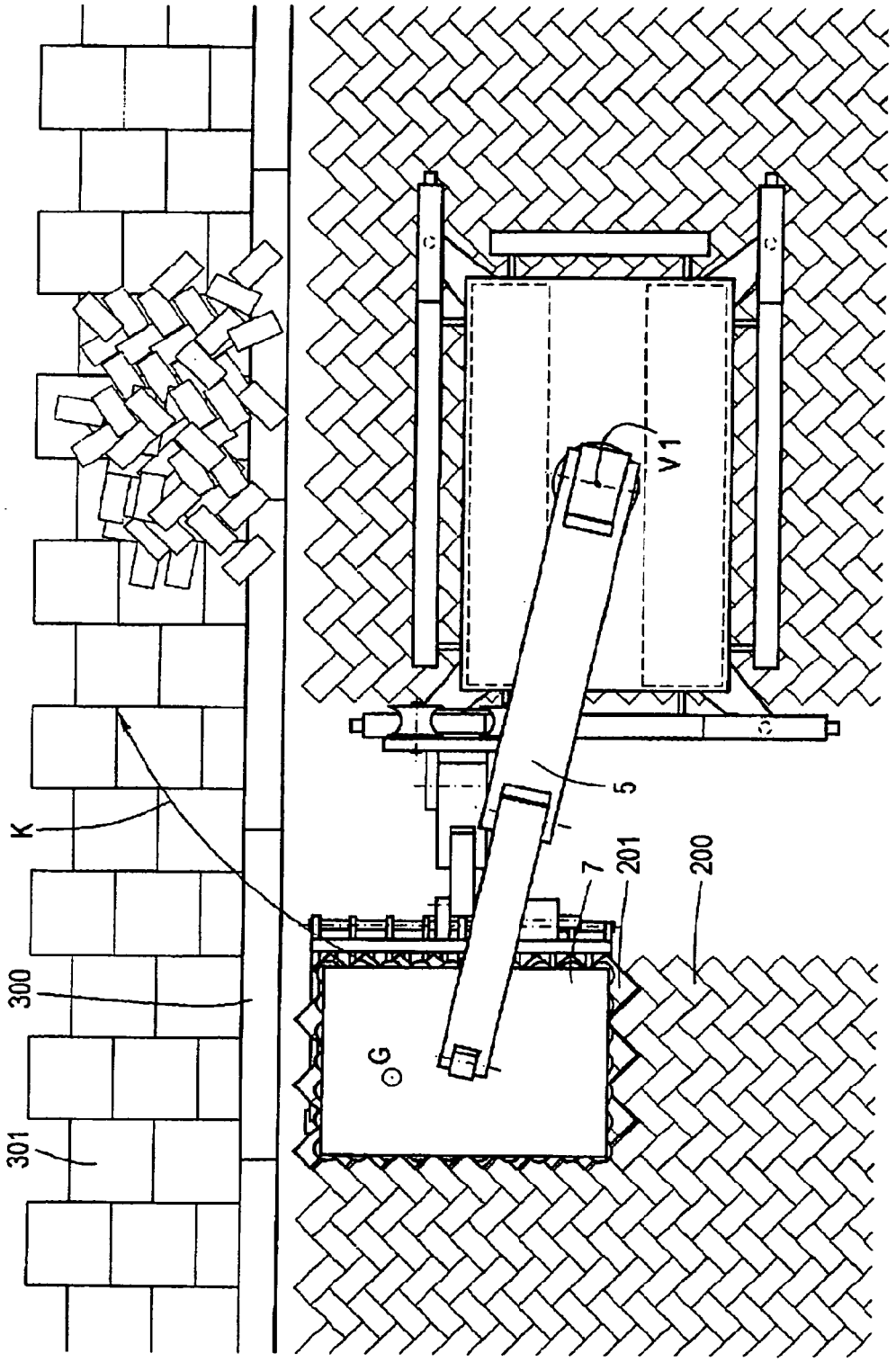

Fig.3D

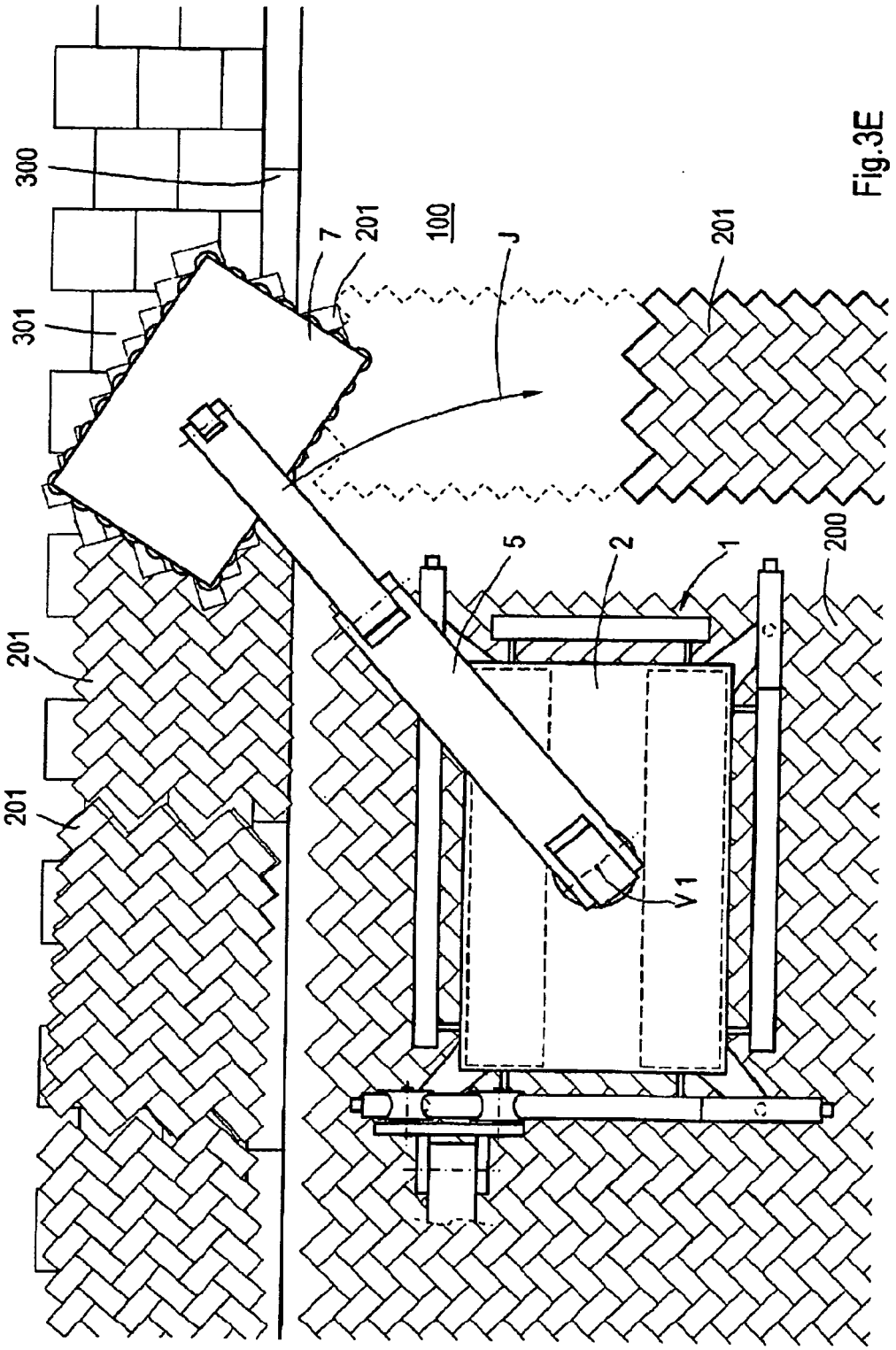

Fig.3E

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EUROPEAN SEARCH REPORT

Application Number
EP 11 01 0041

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	NL 9 001 291 A (JACOBUS OUWEJAN) 2 January 1992 (1992-01-02) * page 1, line 19 - page 2, line 37 * * page 3, line 10 - page 4, line 23; figures 1-4 *	1-6,8,10 7	INV. E01C19/52 E01C23/12
Y	EP 0 256 169 A1 (T B POLAK HANDELENDE ONDER DE [NL]) 24 February 1988 (1988-02-24) * column 4, line 29 - line 41; claim 1; figures *	7	
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A,D	NL 1 016 464 C1 (REIMERT B V GEB [NL]) 24 April 2002 (2002-04-24) * abstract; figures *	1,11	
A	FR 2 604 735 A1 (MARTIN ENTREPRISE CH [FR]) 8 April 1988 (1988-04-08) * abstract; figures *	11	TECHNICAL FIELDS SEARCHED (IPC) E01C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 August 2012	Kremsler, Stefan

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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3

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Office européen des brevets

Application Number
EP 11 01 0041

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

[X] Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

16, 17

[ ] No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

[ ] All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

[ ] As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

[ ] Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

[ ] None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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