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(54) **Abrading group**

(57) An abrading group comprises a plurality of abrading units (4) rotationally mounted on crossbar means (16) extending along a transverse direction (D) that is transverse with respect to an intended advance direction (F) of pieces to be abraded (2), driving means

for rotating each abrading unit (4) around a longitudinal axis thereof (z), further driving means for oscillating said crossbar means (16) along said transverse direction (D), said further driving means is such as to oscillate said crossbar means (16) also along said advance direction (F).

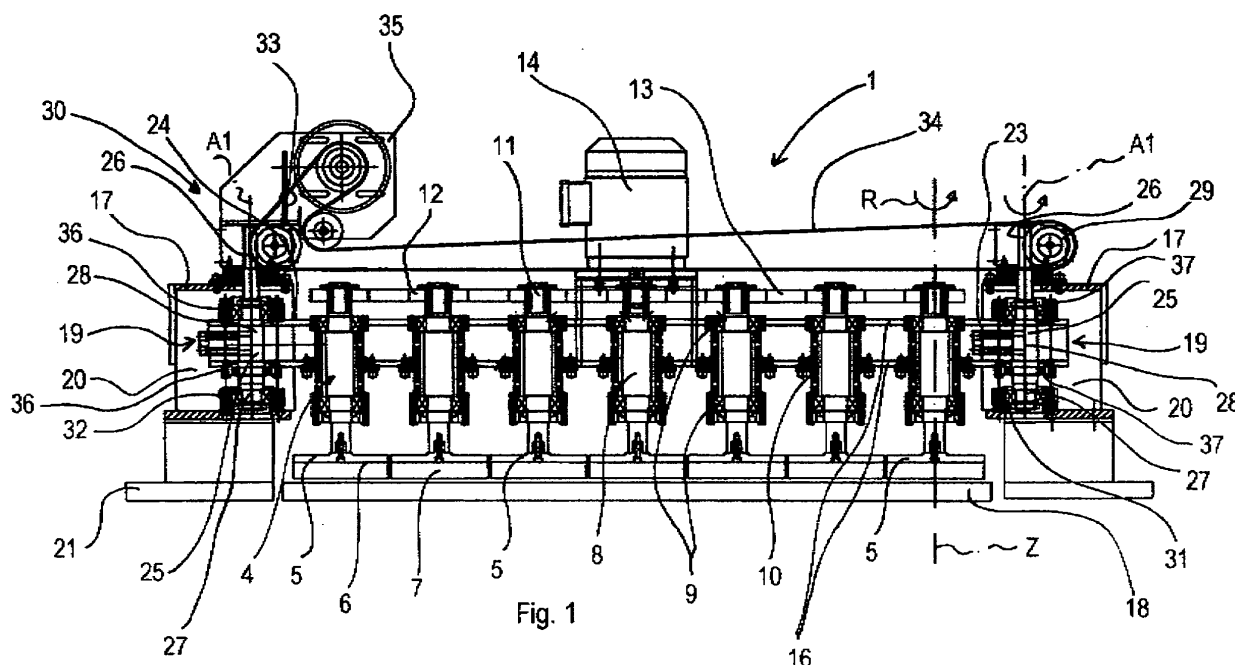


Fig. 1

Description

[0001] The invention relates to an abrading group that is associable with a machine tool, for example a sanding machine arranged for processing wood or comparable materials and a driving method for driving the aforesaid abrading group.

[0002] In particular, the invention relates to an abrading group provided with abrading tools arranged for finishing and sanding corner zones of a piece to be processed, for example a panel.

[0003] Abrading groups are known comprising an endless conveying belt that is positioned transversely to and above a conveyor belt arranged for conveying a piece to be processed.

[0004] The conveying belt moves along a loop path that is substantially transverse to an advance direction of the conveyor belt and comprises a plurality of frontal abrading tools, in particular abrading brushes.

[0005] The abrading brushes are positioned next to one another and are arranged in a row like the keys of a piano, in a substantially parallel manner with respect to the advance direction of the conveyor belt.

[0006] Each abrading brush is further provided with strips of abrasive paper arranged for interacting with a surface to be processed.

[0007] Further abrading groups are known comprising a slide mounted transversely to and above the conveyor belt.

[0008] The slide is driven by a connecting rod-crank unit and is arranged for move forwards and backwards transversely to the advance direction of the conveyor belt and is designed for supporting a plurality of abrading brushes of the aforesaid type.

[0009] Still further abrading groups are known comprising peripherally abrading tools, in particular one or more rotating cylinders, for example two, having opposite rotating directions, which are positioned transversely and above the conveyor belt.

[0010] The rotating cylinders comprise a side surface from which a plurality of abrading elements project radially.

[0011] The abrading elements are positioned substantially transversely with respect to the advance direction of the conveyor belt, in such a way as to come into contact, in use, with the surface to be processed.

[0012] A drawback that besets the aforesaid known abrading groups is that they do not allow uniform finishing of the surface to be sanded.

[0013] In fact, the abrading groups provided with abrading brushes do not allow suitable sanding of corner zones that are substantially transverse with respect to the advance direction of the piece, on the other hand, the abrading groups comprising rotating cylinders do not allow suitable abrading of corner zones that are substantially parallel to the advance direction of the piece.

[0014] For this reason, the aforesaid abrading groups are used together in known sanding machines, the abrad-

ing groups being positioned downstream of one another, in order to ensure even surface finishing.

[0015] It is clear that this, in addition to involving a financial burden, involves difficulties in designing the layout of the system.

[0016] Abrading groups are also known comprising a plurality of frontal abrading tools, in particular abrading discs, each fitted on a respective rotating spindle.

[0017] Each abrading disc comprises a lower surface from which a plurality of supports project, positioned radially, each arranged for supporting abrading blades.

[0018] The rotating abrading discs are supported by a movable frame, which is mounted above and transversely to the conveyor belt.

[0019] The movable frame, driven by pneumatic actuators, is arranged for oscillating along a transverse guide, creating a reciprocating movement.

[0020] In this way, whilst the rotating discs rotate they are moved forwards and backwards by the movable frame.

[0021] A drawback that besets the aforesaid known abrading groups is the discontinuity of the working conditions of the abrading tools at the motion reversal points.

[0022] In fact, at the motion reversal points, a short interval elapses in which the movable frame is substantially stationary.

[0023] Thus, during this interval, the frontal tools abrade the piece only by rotating.

[0024] Therefore, it occurs that a portion of the surface of the piece, which portion has been abraded in this interval, has a surface quality that is inferior to a further portion that has been abraded during normal movement of the frame.

[0025] A further drawback of the aforesaid known abrading groups is the necessity of using two distinct sources of energy: electric energy for rotating the rotating discs and compressed air for moving the movable crossbar.

[0026] In addition to increasing expense, this also entails constructional difficulties inasmuch for using compressed air it is necessary to provide for and install complex pneumatic cabling.

[0027] An object of the invention is to improve the abrading groups associable with sanding machines arranged for processing wood or comparable materials.

[0028] A further object is to obtain an abrading group that improves the surface quality of the piece to be processed.

[0029] A still further object is to obtain abrading groups that are simple to make and of modest cost.

[0030] Still another object is to provide for a driving method for driving the aforesaid abrading groups that enables the surface finishing of the piece to be processed to be improved.

[0031] In a first aspect of the invention, there is provided an abrading group comprising a plurality of abrading units rotationally mounted on crossbar means extending along a transverse direction that is transverse with re-

spect to an intended advance direction of pieces to be abraded, driving means for rotating each abrading unit around a longitudinal axis thereof, further driving means for oscillating said crossbar means along said transverse direction, characterised in that said further driving means is such as to oscillate said crossbar means also along said advance direction.

[0032] In a second aspect of the invention, there is provided a method comprising driving a plurality of abrading units arranged for abrading a surface of a piece to be abraded with a motion having a component along a transverse direction that is transverse with respect to an intended advance direction of said piece to be abraded, characterised in that it comprises further driving said plurality of abrading units with a further motion having a component along said advance direction.

[0033] Owing to the aforesaid aspects of the invention, it is possible to increase the operating fluidity of the abrading units, consequently increasing the surface quality of the processing.

[0034] In fact, owing to the further moving means, it is possible to maintain the abrading units in uninterrupted movement, making the surface quality of the piece uniform.

[0035] Further, the driving means and the further driving means can both be driven by a single energy source, in particular electric energy.

[0036] This makes the pneumatic cabling superfluous that is provided in the known abrading groups, with consequent reduction of manufacturing difficulties and money savings.

[0037] The invention will be better understood and carried into effect with reference to the attached drawings, in which an embodiment of the invention is shown by way of non-limiting example, in which:

Figure 1 is a partially sectioned frontal schematic view of an abrading group;

Figure 2 is a schematic view from above of the abrading group di Figure 1;

Figure 3 is a schematic view from above of the abrading group in Figure 1 in an operating configuration.

[0038] With reference to Figure 1 there is shown an abrading group 1 associable with a sanding machine arranged for processing wood or comparable materials.

[0039] The abrading unit 1 is arranged for finishing and sanding corner zones 3 of a piece 2 to be processed (Figures 2 and 3).

[0040] The abrading group 1 is provided with a plurality of abrading units 4, comprising abrading discs 5 that are frontal and arranged for rotating in a rotation direction R around a substantially vertical axis Z.

[0041] Each abrading disc 5 comprises a surface 6, operationally facing the piece 2, and supporting a plurality of clamps that are not shown.

[0042] The radially positioned clamps are designed for supporting abrading elements 7.

[0043] The abrading elements 7, projecting from the aforesaid clamps, comprise a strip of abrasive paper arranged for abrading the piece 2, and a plurality of supporting bristles.

5 **[0044]** The bristles, having a height extension that is less than the strip of abrasive paper, are positioned in contact with the latter.

[0045] In this way, in use, the bristles support the strip of abrasive paper increasing a flexional stiffness value of the latter, with a consequent increase in abrading capacity.

10 **[0046]** In other words, the bristles, in use, resist the tendency of the abrasive strip to move away from the piece 2, acting as an abutment.

15 **[0047]** Each abrading disc 5 is removably fixed, for example through a threaded connection, to a respective spindle 8.

[0048] Each spindle 8, provided with bearings 9, is supported by a box element 10, extending along a direction that is substantially parallel to the axis Z.

20 **[0049]** The spindle 8 comprises an end 11 on which a drawn pulley 12 is fitted.

[0050] Each drawn pulley 12 is rotated by endless flexible driving means 13 that is controlled by first motor means 14, for example an electric motor.

25 **[0051]** The first motor means 14 further comprises a plurality of tensioning rollers 15 arranged for tensioning the flexible driving means 13 and for ensuring a sufficiently wide winding angle α (Figure 2), which is defined by a portion of the aforesaid flexible driving means 13 in contact with a peripheral portion of the drawn pulley 12.

30 **[0052]** The abrading group 1 further comprises a crossbar 16 arranged for supporting the box elements 9 and consequently the abrading discs 5.

35 **[0053]** The crossbar 16, which is supported at the ends thereof by a frame 17, extends above, and substantially transversely to, a conveyor belt 18 that is arranged for conveying the piece 2, extending and movable along a further substantially horizontal axis X.

40 **[0054]** In other words, the crossbar 16 is positioned substantially transversely with respect to an advance direction F of the aforesaid conveyor belt 18, the advance direction F being substantially parallel to the further axis X.

45 **[0055]** The abrading group 1 further comprises driving means 19 that is arranged for moving the crossbar 16.

[0056] The driving means 19 is received in a space 20 with which the frame 17 is provided, the frame 17 being in turn supported by a base 21.

50 **[0057]** The driving means 19 is positioned substantially at a first end 23 and at a second end 24 of the crossbar 16.

[0058] The driving means 19 comprises shaft means 25 that is arranged for rotating around a first vertical axis A1.

55 **[0059]** The shaft means 25 is provided with a first end portion 26, a second end portion 27 and an eccentric portion 28, which is interposed between the first end por-

tion 26 and the second end portion 27.

[0060] The first end portion 26 and the second end portion 27 extend around the first vertical axis A1, whilst the eccentric portion 28 extends longitudinally around a second vertical axis A2 that is substantially parallel to the first vertical axis A1.

[0061] The first end portion 26 is arranged for engaging with a reduction gear 29 of a motor unit 30, whilst the second end portion 27, which is provided with bearing means 31, is mounted on an annular plate 32 removably fixed to the frame 17.

[0062] The motor unit 30 comprises end pulleys 33 driven by further flexible driving means 34, which is endless and moved by second motor means' 35, for example an electric motor.

[0063] The first end 23 and the second end 24 of the crossbar 16 are fitted on the eccentric portion 28 through fixing means 36 provided with further bearing means 37.

[0064] During working (Figure 3), the eccentric portion 28 rotates around the first vertical axis A1, which is different from, and parallel to, the second vertical axis A2.

[0065] In this way, the eccentric portion 28 is able to transmit a motion to the crossbar 16, which is integral with the eccentric portion 28.

[0066] This motion, which is induced by the eccentric portion 28, comprises a component C that is substantially parallel to the advance direction F of the piece 2 and a component D that is substantially perpendicular to the advance direction F of the piece 2.

[0067] During working, therefore, the abrading discs 5, in addition to rotating around the rotation axis Z, are also moved by the crossbar 16 along a trajectory that is defined by the substantially parallel component C and by the substantially perpendicular component D.

[0068] It should be noted that this makes it possible to increase the operating fluidity of the abrading discs 5, consequently improving the surface quality of the processing.

[0069] In fact, the abrading discs 5, whilst they rotate, are moved without interruptions along the aforesaid trajectory.

[0070] It is clear how this makes sanding of the piece 2 more uniform with consequent improvement of the surface quality of the processing.

[0071] Furthermore, the first motor means 14 and the second motor means 35 are both driven by a single energy source, in particular electric energy.

[0072] This makes the pneumatic cabling superfluous that are provided in the known abrading groups with consequent reduction of manufacturing difficulties and money saving.

transverse direction (D) being transverse with respect to an intended advance direction (F) of pieces (2) to be abraded, driving means for rotating each abrading unit (4) around a longitudinal axis (Z) thereof, further driving means for oscillating said crossbar means (16) along said transverse direction (D), **characterised in that** said further driving means is such as to oscillate said crossbar means (16) also along said advance direction (F).

2. Abrading group according to claim 1, wherein said further driving means comprises eccentric driving means (28).
3. Abrading group according to claim 2, wherein said eccentric means is obtained in a portion (28) of longitudinal extent of shaft means (25).
4. Abrading group according to claim 3, wherein said portion (28) is coupled with said crossbar means (16).
5. Abrading group according to claim 3, or 4, wherein said shaft means (25) comprises an end portion (26) that is rotated by an electric motor (35).
6. Abrading group according to any preceding claim, wherein each abrading unit (4) comprises abrading disc means (5) operationally facing said pieces (2) to be abraded.
7. Method comprising driving a plurality of abrading units (4) arranged for abrading a surface (3) of a piece (2) to be abraded with a motion having a component along a transverse direction (D), said transverse direction (D) being transverse with respect to an intended advance direction (F) of said piece (2) to be abraded, **characterised in that** it further comprises driving said plurality of abrading units (4) with a further motion having a component along said advance direction (F).
8. Method according to claim 7, wherein said driving occurs by moving crossbar means (16) on which said plurality of abrading units (4) is mounted.
9. Method according to claim 7, or 8, and further comprising rotating each abrading unit (4) around a longitudinal axis thereof (z).

Claims

1. Abrading group comprising a plurality of abrading units (4) rotationally mounted on crossbar means (16) extending along a transverse direction (D), said

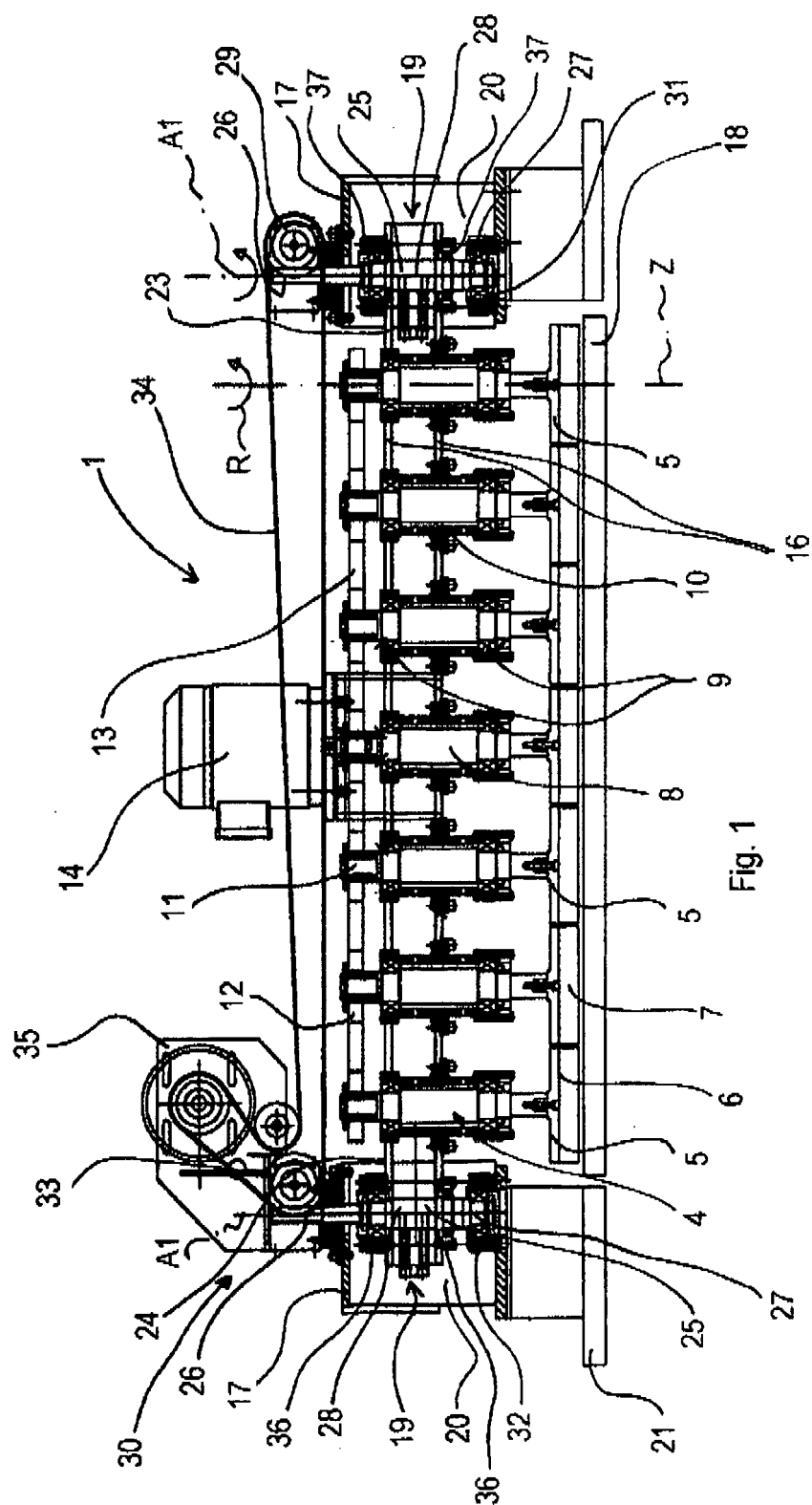
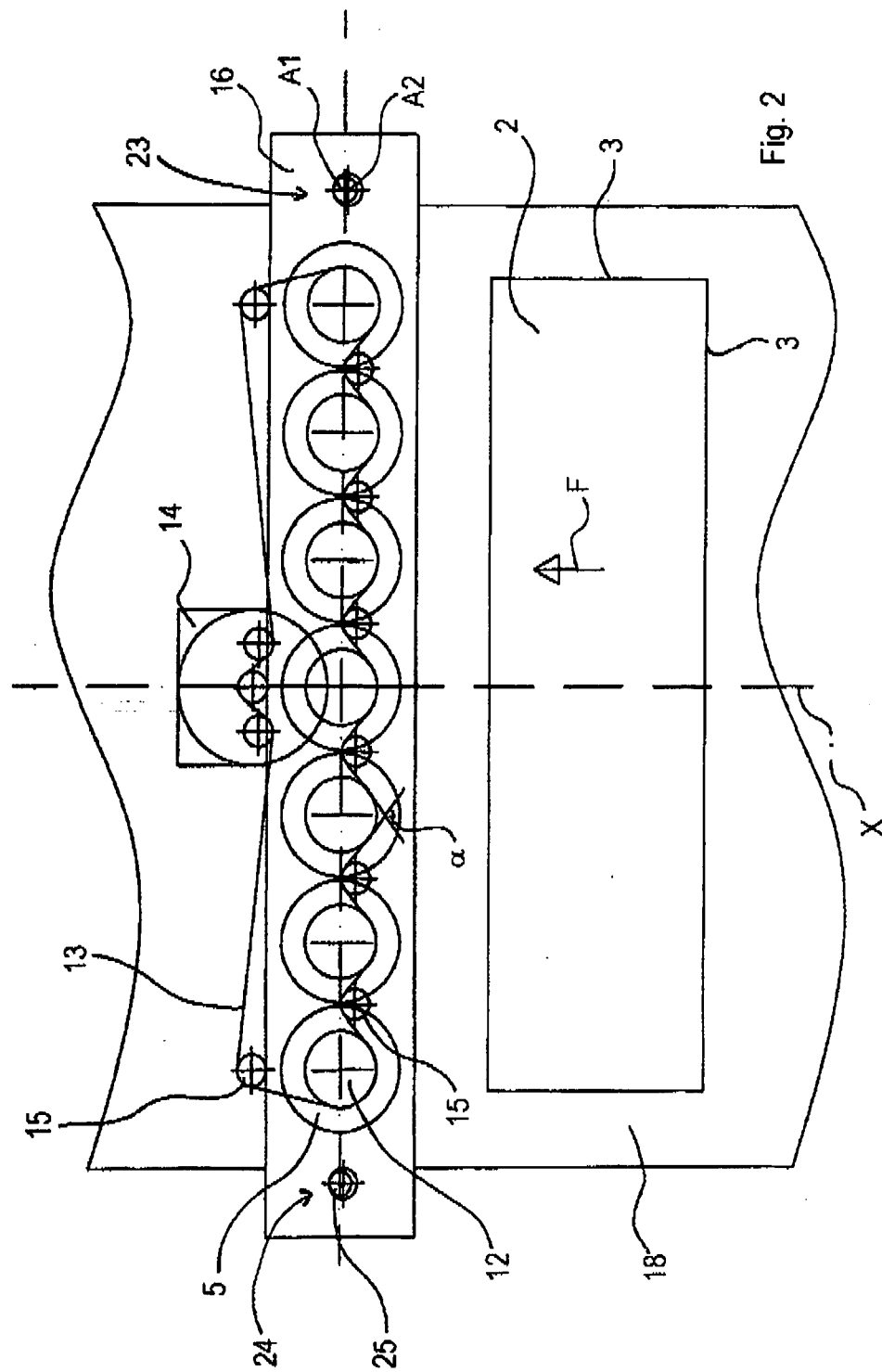
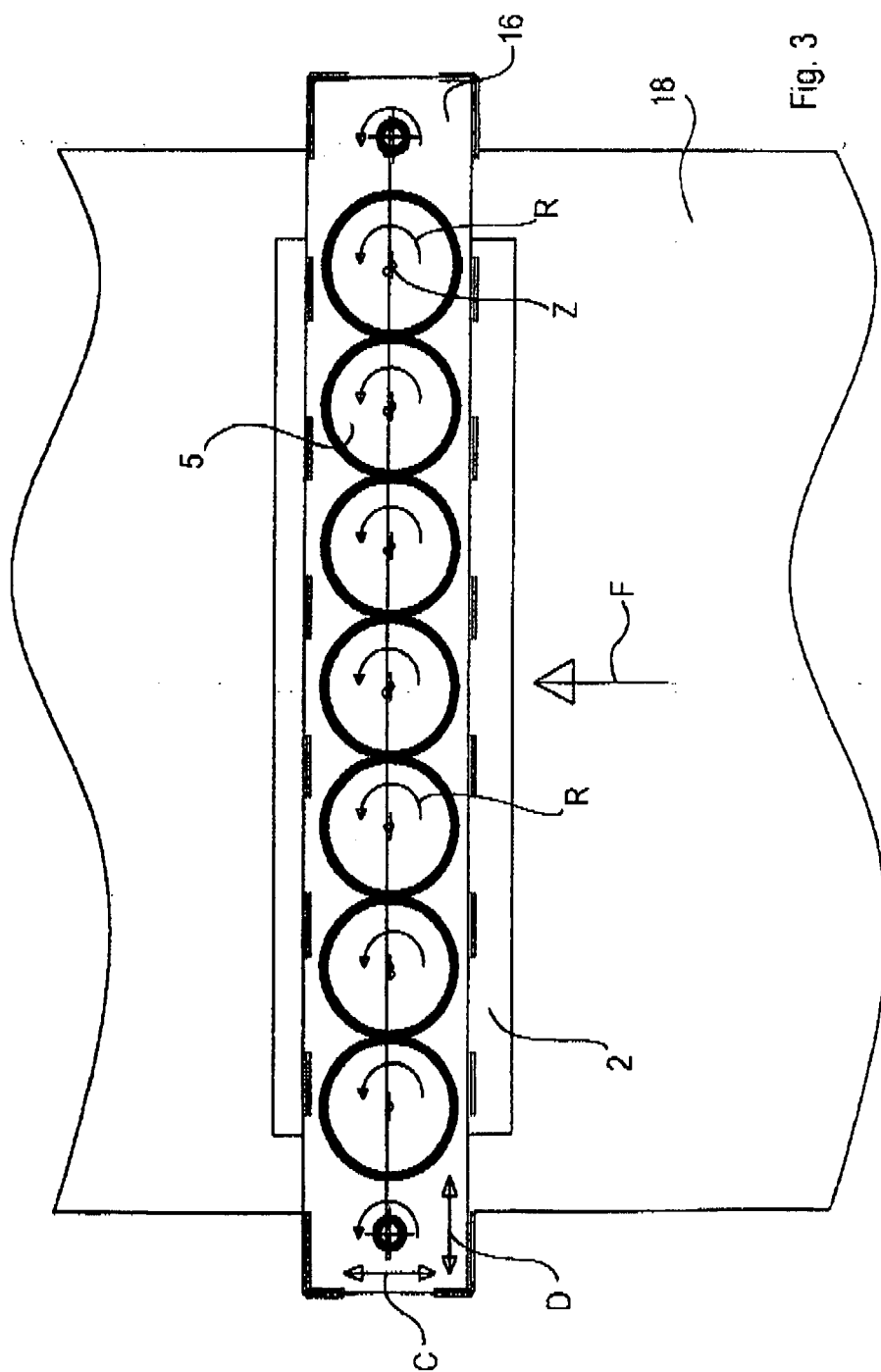


Fig. 1







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 06 02 0978

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 December 2006	Examiner Eder, Raimund
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 O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

2

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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