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(11) **EP 1 526 208 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.04.2005 Bulletin 2005/17

(51) Int Cl.7: **D06C 11/00, D06C 5/00**

(21) Application number: **04105072.5**

(22) Date of filing: **15.10.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL HR LT LV MK

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(30) Priority: **17.10.2003 IT UD20030208**

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(54) **Device and method for grinding tubular fabrics**

(57) Device and method for grinding a tubular fabric (11), wherein the device comprises a support and transport element (13) on which the tubular fabric (11) is positioned in order to be widened, supported and made to advance in a determinate direction. The device also comprises grinding elements (21) arranged around said support and transport element (13) which are brought into contact with the outer surface (11a) of the tubular fabric (11) positioned on the support and transport element (13), in order to perform a grinding action on the outer surface (11a) of the tubular fabric (11).

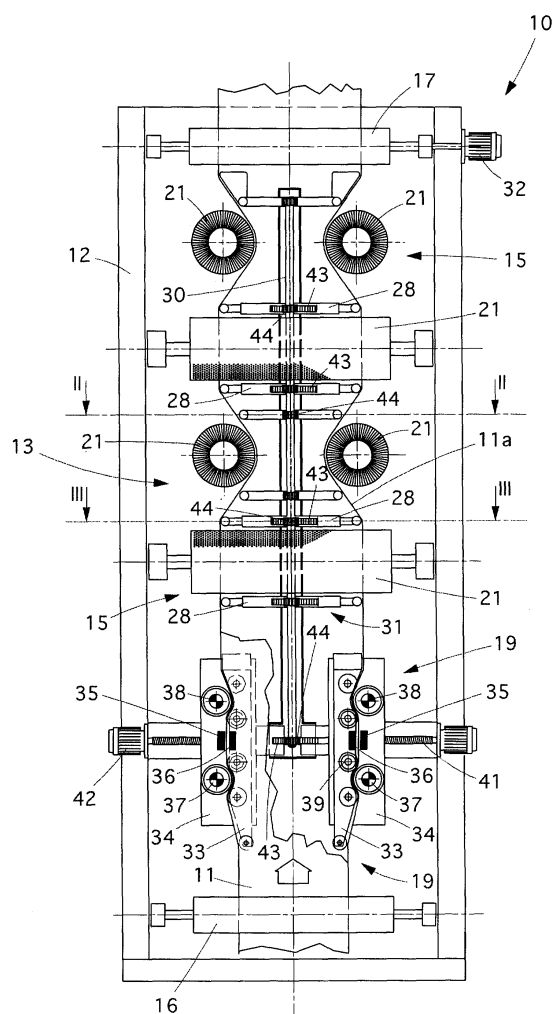


fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a device, and the relative method, for grinding tubular fabrics, particularly hosiery fabrics or suchlike.

[0002] By the term grinding, we mean a treatment to finish fabrics suitable to give the feel of the fabric particular aesthetic effects, for example, ageing, pre-washing or the so-called peach-skin effect.

BACKGROUND OF THE INVENTION

[0003] It is known that the grinding of a fabric is performed by drawing the textile material in contact with a plurality of rollers, covered on the surface with abrasive material such as abrasive paper, diamond paper, filaments or other. Instead of rollers brushes can be used or other similar means, or even plates covered with abrasive material.

[0004] The action of the abrasive material on the fabric produces a partial removal of fibrous material, causing the formation of a surface down that is more or less accentuated according to the final result or characteristics of feel to be obtained. Grinding is normally performed on dry textile material or even, in some cases, on material that has been previously wet or dampened.

[0005] The various known grinding devices for tubular fabrics include various disadvantages, to a greater or lesser extent, including the need for complex accessory components for widening and/or stretching the fabric, great spaces occupied if several passes of the fabric on the abrasive elements are required, low productivity, poor uniformity in the treatment, especially if the fabric has extensive surfaces, and other problems.

[0006] To be more exact, a problem that businessmen working in this field complain of in particular is that deriving from the signs and marks that are impressed on the outer face of the fabric by the widening elements arranged along the grinding path, for example between one brush/roller and the next, in order to keep the tubular fabric correctly widened and tensioned.

[0007] One purpose of the present invention is to achieve a grinding device for a tubular fabric that limits to a minimum the need for accessory devices, that reduces the operating times, increases productivity and reduces the overall bulk given the same number of grinding passes.

[0008] Another purpose is to guarantee a high uniformity of the grinding action even when the fabric to be treated has extensive surfaces.

[0009] Another purpose is to reduce to a minimum the contact between the fabric and the widening elements, thus preventing the risk of marks or signs being made on the fabric.

[0010] Applicant has devised, tested and embodied the present invention to overcome the shortcomings of

the state of the art and to obtain these and other purposes and advantages.

SUMMARY OF THE INVENTION

[0011] The present invention is set forth and characterized in the main claims, while the dependent claims describe other characteristics of the present invention or variants to the main inventive idea.

[0012] In accordance with the above purposes, a device for grinding a tubular fabric according to the present invention comprises a support and transport element on which said tubular fabric is able to be positioned in order to be widened, supported and fed in a determinate direction, and grinding elements arranged around said support and transport element and able to be taken into contact with the outer surface of the tubular fabric, positioned on the support and transport element, in order to achieve a grinding action on said outer surface.

[0013] In a preferential form of embodiment, the support and transport element comprises at least an inlet element, the function of which is to open and progressively dilate the tubular fabric as it advances.

[0014] In a first embodiment, said inlet element comprises a widening device, for example of a magnetic, mechanical or other type, which consists of at least a pair of arms on which the tubular fabric is positioned. The arms can be selectively brought closer to each other or distanced from each other in order to widen or narrow the tubular fabric to the desired extent, for example according to the size, and in order to guarantee at the same time that the desired tension is maintained.

[0015] According to a variant, the inlet element comprises a shaped element with a divergent conformation starting from the inlet of the tubular fabric.

[0016] Downstream of the inlet element, the support and transport element comprises a supporting and guiding structure on which the tubular fabric advances, and around which the grinding elements are arranged.

[0017] In a first embodiment, the supporting and guiding structure consists of a plurality of frames, disks or rings, arranged in succession and distanced from each other along the path on which the tubular fabric is fed; the tubular fabric is progressively positioned thereon so as to be accompanied from inlet to outlet of the grinding zone.

[0018] In a preferential embodiment, all the frames lie on respective planes substantially parallel to each other. According to a variant, the frames have an asymmetrical geometric configuration with respect to at least an axis; for example they are rectangular in shape and are arranged with a different orientation on respective lying planes in order to modify the arrangement of the faces of the tubular fabric with respect to the grinding elements.

[0019] In another preferential embodiment, the frames are made in such a manner as to be able to vary their section size; for example they are made in two or

more parts, the ends of which are telescopically associated. In this way, it is possible to modify the transit section as required by the size of the tubular fabric, and also to adjust the tension of the tubular fabric according to the type of processing to be done and the grinding result to be obtained.

[0020] In a preferential embodiment, each of said frames is made in at least two parts that can be separated in independent manner, so that each frame can be dis-assembled from the relative central shaft without requiring that it be removed axially. This considerably facilitates and accelerates the operations to re-adapt the support and transport element if the format of the tubular fabric to be treated has to be changed.

[0021] In a further preferential embodiment, the widening device is kinematically connected to at least some of the frames so that, when adjustment is made at inlet to the device to bring closer/distance the widening device, all the frames connected to the widening device are in turn adjusted dimensionally in a coordinated manner. Advantageously, this adjustment is made automatically, by driving a command member. In a further variant, the command member is governed by a programmable control unit in which various adjustment parameters can be set according to the tubular fabric to be treated and the treatment to be done.

[0022] In a second embodiment, said supporting and guiding structure consists of a supporting body or core, with a substantially continuous shape, which has a substantially constant section between inlet and outlet of the tubular fabric. According to a variant, it has a progressively widening or narrowing section from inlet to outlet of the tubular fabric.

[0023] In a first form of embodiment, the supporting body or core has a polygonal section with plane sides, so that the grinding elements, advantageously each associated with a relative side of said supporting body or core, can act on a relative substantially plane face of the tubular fabric.

[0024] In a preferential embodiment, the supporting body or core has a quadrangular, square or rectangular section, and at least one grinding element is associated with each of the faces thereof. According to evolutionary variants of the invention, the supporting body or core has a triangular, pentagonal, hexagonal section, etc.

[0025] According to these embodiments, a preferential formulation of the invention provides that at least some of the grinding elements associated with different faces of the supporting body or core are arranged on different levels along the support and transport element. The grinding elements that lie on different levels are arranged angled one with respect to the other according to the angle formed between two adjacent faces of said supporting body or core.

[0026] In the event that the supporting body or core has a quadrangular section, grinding elements cooperating with adjacent faces of the supporting body or core are arranged superimposed one on top of another along

the direction of feed of the tubular fabric and are orthogonal to each other in twos.

[0027] Advantageously, the grinding elements have their axis lying on a plane substantially orthogonal to the plane on which the axis of feed of the tubular fabric lies.

[0028] In another form of embodiment, the supporting body or core has a substantially circular section and at least the inlet end, advantageously also the outlet end, has a progressively tapered section; thanks to this, the tubular fabric entering the device can be progressively widened and put under tension in correspondence with the cylindrical part where contact with the grinding elements occurs.

[0029] According to a variant, the supporting body or core has a constant section and cooperates, at least upstream, with a widening element with a divergent conformation.

[0030] According to this embodiment with a cylindrical supporting body or core, there are at least two grinding elements, advantageously three or more, arranged angularly distanced from each other following at least a circumference around said cylindrical body and associated with respective drive means able to make them rotate according to an axis of rotation.

[0031] In a first embodiment, said grinding elements have an angularly fixed position with respect to the support and transport element.

[0032] According to a variant, said grinding elements are mounted on an annular support suitable to rotate, with an axis of rotation substantially coinciding with the longitudinal axis of the support and transport element, in order to induce a revolutionary movement of the brushes, while they are rotating on their own axis, around said support and transport element. In this way, the action of even a limited number of grinding elements can cover the whole circumference of the tubular fabric while it is advancing longitudinally on the support and transport element.

[0033] In a preferential embodiment, the device comprises two or more groups of grinding elements, arranged at different heights along the longitudinal development of the support and transport element, each group comprising a plurality of grinding elements arranged angularly distanced around the support and transport element.

[0034] According to this embodiment, in the case of angularly fixed grinding elements, those present on a first annular support are advantageously arranged angularly offset with respect to those present on an adjacent annular support, so as to cover the whole surface of the tubular fabric passing through without leaving strips or bands that are not treated.

[0035] In a first embodiment, which is applied both to supporting bodies with a polygonal section and also to those with a circular section, the support and transport element has an outer surface substantially continuous for the whole of its development, so as to function as a supporting and positioning plane for the tubular fabric

for the whole of its extension.

[0036] According to a variant, the support and transport element has a discontinuous surface so that at least along part of its development the grinding elements act on a tubular fabric that is not totally supported and can thus exert a deeper and more effective action.

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] These and other characteristics of the present invention will become apparent from the following description of some preferential forms of embodiment, given as a non-restrictive example, with reference to the attached drawings wherein:

- fig. 1 is a schematic lateral view, partly in section, of a first form of embodiment of a device for grinding a tubular fabric according to the invention;
- figs. 2 and 3 show respectively the sections from II to II and from III to III of fig. 1;
- fig. 4 is a schematic perspective view of the device in fig. 1;
- fig. 5 is a schematic lateral view of a second form of embodiment of the device according to the invention;
- fig. 6 is a view from above of a variant of the device in fig. 5;
- fig. 7 shows a section from VII to VII of fig. 5.

DETAILED DESCRIPTION OF SOME PREFERENTIAL FORMS OF EMBODIMENT

[0038] With reference to the attached figures, a grinding device 10 according to the invention for grinding a tubular fabric 11 comprises a frame 12, in this case extending vertically, inside which a support and transport element 13 is arranged for the tubular fabric 11.

[0039] Around the support and transport element 13 there are grinding groups 15, comprising in this case brushes 21, arranged one on top of the other along the longitudinal development of the support and transport element 13. The brushes 21 have an abrasive or filamentary covering in order to perform the grinding action on the tubular fabric 11 passing along the support and transport element 13.

[0040] The brushes 21 are associated both with motor means, not shown here, so as to be made to rotate on their axis at least when they are in contact with the surface of the tubular fabric 11, and also with movement means, of a known type and not shown here, able to move them selectively from a position of contact to a position distanced from the tubular fabric 11 passing through, as shown by the arrows in figs. 2, 3 and 4.

[0041] In correspondence with the lower part and the upper part of the frame 12, two groups of drawing rollers are provided, respectively an inlet roller 16 and an outlet roller 17, able to feed the tubular fabric 11 from inlet to outlet of the support and transport element 13. The out-

let roller 17 is associated with a relative motor 32.

[0042] In the first embodiment shown in figs. 1-4, the support and transport element 13 has a supporting and guiding structure 31, consisting of a plurality of little frames 28, with a quadrangular section, in this case square or rectangular, so as to define four substantially plane working surfaces 31a, 31b, 31c, 31d (fig. 4); relative grinding brushes 21 cooperate with each of them.

[0043] According to the variants shown in figs. 5 and 6, the support and transport element 13 consists of a continuous supporting body 31, with a desired section, in this case circular.

[0044] To be more exact, the brushes 21 are arranged in superimposed pairs on several levels along the supporting and guiding structure 31, each pair having brushes 21 arranged with an axis substantially parallel to each other, the brushes 21 of superimposed pairs having a reciprocally orthogonal axis.

[0045] The brushes 21 of each pair can be arranged on the same level (fig. 1) or slightly offset along the support and transport element 13.

[0046] Each brush 21 is arranged so as to cover, with an axis substantially orthogonal to the direction of feed of the tubular fabric 11, a relative surface 31a-31d of the supporting and guiding structure 31. When the supporting and guiding structure 31 has a triangular, pentagonal, hexagonal section or other, there can be one brush 21 for every level and the angle formed between the brushes 21 of adjacent levels will be greater or less than 90° according to the different cases.

[0047] The little frames 28 are mounted on a supporting shaft 30 by means of flanges 29. In this case, each little frame 28 is made in two independent halves, respectively 128a and 128b (figs. 2 and 3), so that each of them can be removed laterally and autonomously from the supporting shaft 30 without requiring them to be removed axially, which would entail long and complex operations to dismantle and disconnect the other operating groups of the grinding device 10.

[0048] According to an advantageous variant, as will be seen hereafter in detail and as indicated by the arrows in figs. 2 and 3, the two halves 128a and 128b of each little frame 28 can be mounted on the supporting shaft 30 in an independently adjustable manner, at least in a lateral direction, according to the size of the tubular fabric 11 to be treated and the value of tension that is to be imparted thereto during processing.

[0049] Upstream of the supporting and guiding structure 31 the support and transport element 13 has a widening element 19, the function of which is to open and progressively dilate the tubular fabric 11 entering, until it becomes gripped by the lower part of the supporting and guiding structure 31.

[0050] The widening element 19 consists (figs. 1 and 4) of a pair of arms 33 on which the tubular fabric 11 is positioned, each of which cooperates with a relative block 34, arranged outside and in proximity with a rela-

tive arm 33. On the arms 33 and the blocks 34 respective magnetic elements 35 and 36 are mounted, the function of which is to determine a reciprocal attraction between the block 34 and the relative arm 33, with the tubular fabric 11 positioned between them.

[0051] Wheels, respectively lower 37 and upper 38, mounted on the blocks 34, are commanded by a motor 40 and contribute to the feed of the tubular fabric 11, while support and guide wheels 39 are mounted on the arms 33. The motor 40 and the motor 32 of the outlet roller 17 are independently commanded, so that it is possible to adjust to the desired value the tension of the tubular fabric 11 passing through, possibly modifying it also during the treatment according to needs.

[0052] The blocks 34 are mounted on respective screw-type shafts 41, connected to respective motors 42. Driving the motors 42 in one direction of rotation or the other determines a corresponding reciprocal distancing or drawing closer of the blocks 34 according to the entity of the widening to be imparted to the tubular fabric 11 at inlet to the grinding device 10.

[0053] The arms 33 are mounted on the supporting shaft 30 on which the little frames 28 are also mounted, and are connected to it, in this case, by means of a relative rack 43 which engages on a sprocket 44 solid with the supporting shaft 30.

[0054] In turn, the individual components 128a and 128b of each little frame 28 are also mounted on the supporting shaft 30 by means of a respective rack 43 which engages on a relative sprocket 44 solid with the supporting shaft 30.

[0055] The drive of the motors 42 is advantageously governed by a control unit in which working programs can be set according to the type and size of the tubular fabric 11 to be treated and the type of grinding treatment to be done.

[0056] Thanks to this configuration, it is possible to set the value of widening to be imparted to the tubular fabric 11 at inlet to the grinding device 10 by acting on said motors 42, which make the respective screw-type shafts 41 rotate in the pre-determined direction, and displace the relative blocks 34 in the corresponding manner. The presence of the mating magnetic elements 35 and 36 causes the arms 33 to remain magnetically attracted by the relative blocks 34, and hence to be displaced laterally in a corresponding manner, moving the relative racks 43 and therefore making the relative sprocket 44 rotate.

[0057] The rotation of the sprocket 44 of the widening element 19 makes the supporting shaft 30 rotate, and hence all the sprockets 44 associated with each little frame 28. By means of the respective pairs of racks 43, motion is then transferred simultaneously from the widening element 19 to all the little frames 28, that is, to the whole supporting and guiding structure 31, which therefore widens and narrows according to the command imparted by the control unit which regulates the drive of the motors 42.

[0058] This command system allows, in a relatively simple and economical manner, to adapt on each occasion the geometry of the supporting and guiding structure 31 to the specific operating situation, according to the type of tubular fabric 11 to be treated and the operating result to be obtained.

[0059] Once the desired parameters of width and tension to be imparted to the tubular fabric 11 have been set, and which, moreover, can be modified even during the grinding process, the tubular fabric 11 is positioned on the widening element 19 and on the little frames 28, and the operation to feed it is begun, by driving the motors at inlet 40 and at outlet 32.

[0060] The tubular fabric 11, fed by the inlet rollers 16 in a closed and flattened form, is progressively widened on the widening element 19 and is arranged, widened and dilated, on the supporting and guiding structure 31, so as to be subjected to the grinding action performed by the brushes 21, in the meantime brought into contact with the tubular fabric.

[0061] For the inlet step, it may be provided to use a segment of discard or an added segment applied on the tubular fabric 11 to be ground.

[0062] Each brush 21 acts on a relative substantially plane face of the tubular fabric 11, which can be either completely supported below, in the case of a continuous supporting body 31 such as that shown in fig. 5, or simply supported between two points, as in fig. 1, with the brushes 21 penetrating in greater depth into the surface of the tubular fabric 11.

[0063] The tubular fabric thus ground is discharged by the outlet rollers 17. It comes within the field of the invention that a same face of the tubular fabric 11 can be subjected to several grinding passes in the grinding device 10, or that the tubular fabric 11 can be turned over and returned to the grinding device 10 so that the opposite face can be ground.

[0064] In the embodiment shown in figs. 5 and 6, where the same numbers identify components equal or equivalent to those described heretofore, the support and transport element 13 has a supporting body 31 with a substantially circular section with the ends 19 and 20 tapered so as to facilitate respectively the operations to attach and detach the tubular fabric 11 to/from the support and transport element 13.

[0065] The support and transport element 13 is supported below and stabilized above by respective toroidal elements 23, cooperating with the tapered ends 19 and 20.

[0066] The grinding brushes 21 are arranged, with an axis of rotation substantially orthogonal to the direction of feed of the tubular fabric 11, around the support and transport element 13, and are mounted rotatable on relative rings 26 by means of respective levers 25. Thanks to the levers 25, the brushes 21 can be distanced from the support and transport element 13 in the step when the tubular fabric 11 is positioned, and taken into contact with the tubular fabric 11 when the grinding cycle is start-

ed.

[0067] The rings 26 are arranged parallel with each other, coaxial with each other and with the support and transport element 13 and can be either fixed or rotating, in the second case to guarantee that the whole outer surface 11a of the tubular fabric 11 is ground, even with a limited number of brushes 21. With fixed rings 26, the brushes 21 mounted on two adjacent rings 26 are angularly offset so as to guarantee that the outer surface 11a of the tubular fabric 11 advancing on the support and transport element 13 is completely covered.

[0068] According to the variant shown in fig. 7, at least some of the brushes 21 are mounted on the relative rings 26 with an axis of rotation substantially parallel to the direction of feed of the tubular fabric 11.

[0069] According to another variant, articulated means are provided, not shown here, suitable to direct in a desired manner the individual brushes 21 in order to move them from a substantially horizontal position to a substantially vertical position or in any other suitable intermediate position.

[0070] It is clear, however, that modifications and/or additions of parts or steps may be made to the grinding device 10 and the relative grinding method as described heretofore, without departing from the field and scope of the present invention.

[0071] For example, the tubular fabric 11 can be introduced into the frame 12 from above downwards, or it can make alternate working cycles first in one direction and then in the other. The supporting and guiding structure 31 can also have an elliptical transverse section, or other type. In these cases the arrangement of the brushes 21 has to be planned accordingly, so as to ensure that grinding is performed on all the outer surface 11a of the tubular fabric 11. The supporting and guiding structure 31 can also have a shaped outer surface, so as to improve the conditions of contact between the tubular fabric 11 and the grinding brushes 21.

Claims

1. Device for grinding a tubular fabric (11), **characterized in that** it comprises a support and transport element (13) on which said tubular fabric (11) is able to be positioned in order to be widened, supported and made to advance in a determinate direction, and grinding elements (21) arranged around said support and transport element (13) and able to be brought into contact with the outer surface (11a) of said tubular fabric (11) positioned on said support and transport element (13), in order to perform a grinding action on said outer surface (11a).
2. Device as in claim 1, **characterized in that** said support and transport element (13) comprises a supporting and guiding structure (31) for said tubular fabric (11), and a widening element (19) ar-

ranged at least upstream of said supporting and guiding structure (31) in cooperation with the inlet of the tubular fabric (11) into the device (10).

3. Device as in claim 2, **characterized in that** said widening element (19) is in a single piece with said supporting and guiding structure (31).
4. Device as in claim 2, **characterized in that** said widening element (19) is a separate element from said supporting and guiding structure (31).
5. Device as in claim 2, **characterized in that** said supporting and guiding structure (31) consists of a plurality of little frames (28) mounted one on top of the other on a central shaft (30) and able to define a discontinuous frame which confers the desired widened form to the advancing tubular fabric (11).
6. Device as in claim 5, **characterized in that** each of said little frames (28) is made in two parts (128a, 128b) able to be displaced laterally one with respect to the other.
7. Device as in claim 6, **characterized in that** said parts (128a, 128b) are able to be separated from each other.
8. Device as in claim 6, **characterized in that** each of said parts (128a, 128b) is associated to said shaft (30) by means of a mechanical system (43, 44) able to convert a rotation of said shaft (30) into a movement of lateral displacement of the parts (128a, 128b) one with respect to the other and in respectively opposite directions.
9. Device as in claims 4 and 5, **characterized in that** said widening element (19) includes widening means (33) able to be adjusted at least laterally, said widening means (33) being kinematically connected to said shaft (30) by means of a mechanical system (43, 44) in order to transmit a received command of lateral displacement to all said little frames (28).
10. Device as in claim 9, **characterized in that** said widening means comprise at least a pair of arms (33) on which said tubular fabric (11) is positioned, and relative blocks (34) arranged facing a relative arm (33) and outside the tubular fabric (11).
11. Device as in claim 10, **characterized in that** on said arms (33) and on said blocks (34) mating magnetic elements (35, 36) are provided able to exert a force of reciprocal attraction between arm (33) and relative block (34), said tubular fabric (11) being located between them.

12. Device as in claim 11, **characterized in that** said blocks (34) are associated with respective motor means (42) able to move them laterally according to the desired widening to be imparted to said tubular fabric (11). 5
13. Device as in claim 12, **characterized in that** said motor means (42) are associated with a programmable control unit in order to set programs to adjust the widening and tension of the tubular fabric (11) that vary at least according to the type of tubular fabric (11) and the treatment to be performed. 10
14. Device as in claim 10, **characterized in that** driven wheels (37, 38) are mounted on said blocks (34) in order to feed said tubular fabric (11). 15
15. Device as in claim 10, **characterized in that** supporting and guiding wheels (39) for said tubular fabric (11) are mounted on said arms (33). 20
16. Device as in any claim from 1 to 4 inclusive, **characterized in that** said supporting and guiding structure (31) has a substantially constant section between inlet to and outlet from the device (10). 25
17. Device as in any claim from 1 to 4 inclusive, **characterized in that** said supporting and guiding structure (31) has a section that widens or narrows between inlet to and outlet from the device (10). 30
18. Device as in any claim hereinbefore, **characterized in that** said supporting and guiding structure (31) has a polygonal section defining a plurality of substantially plane faces (13a-13d). 35
19. Device as in claim 18, **characterized in that** a relative grinding element (21) is associated with each of said substantially plane faces (13a-13d). 40
20. Device as in claim 19, **characterized in that** said grinding elements (21) are arranged with their axis lying on a plane substantially orthogonal to the plane on which the axis of feed of said tubular fabric (11) lies. 45
21. Device as in claims 18 to 20, **characterized in that** at least the grinding elements (21) associated with adjacent faces of said supporting and guiding structure (31) are arranged longitudinally on different levels of said supporting and guiding structure (31). 50
22. Device as in any claim from 1 to 4 inclusive, **characterized in that** said supporting and guiding structure (31) has a substantially circular section wherein the inlet end for the tubular fabric (11) has a progressively divergent section and defines said widening element (19). 55
23. Device as in claim 22, **characterized in that** said supporting and guiding structure (31) has the outlet end (20) for said tubular fabric (11) with a progressively convergent section.
24. Device as in claim 1, **characterized in that** said grinding elements (21) are arranged angularly distanced following at least a circumference around said support and transport element (13) and associated with respective drive means able to make them rotate according to an axis of rotation.
25. Device as in claim 24, **characterized in that** said grinding elements (21) have an angularly fixed position with respect to said support and transport element (13).
26. Device as in claim 24, **characterized in that** said grinding elements (21) are mounted on an annular support (26) suitable to rotate, with an axis of rotation substantially coinciding with the longitudinal axis of said support and transport element (13), in order to induce a revolutionary movement of said grinding elements (21), while they are rotating on their own axis, around said support and transport element (13).
27. Device as in any claim from 24 to 26 inclusive, **characterized in that** it comprises two or more groups (15) of grinding elements (21), arranged at different heights along the longitudinal development of said support and transport element (13), each group (15) comprising a plurality of grinding elements (21) arranged angularly distanced around said support and transport element (13).
28. Device as in claim 27, **characterized in that** in the case of angularly fixed grinding elements (21), the grinding elements (21) of a first group (15) are arranged angularly offset with respect to the grinding elements (21) present on a second adjacent group (15), so as to cover the whole surface of the tubular fabric (11) passing through without leaving untreated bands or strips.
29. Method for grinding a tubular fabric (11), **characterized in that** it comprises a first step wherein said tubular fabric (11) is positioned on a support and transport element (13) in order to be widened and positioned with respect to grinding means (15), and at least a second step wherein grinding means (15), comprising a plurality of grinding elements (21) arranged around said support and transport element (13), are taken into contact with the outer surface (11a) of said tubular fabric (11), positioned on said support and transport element (13), in order to perform said grinding.

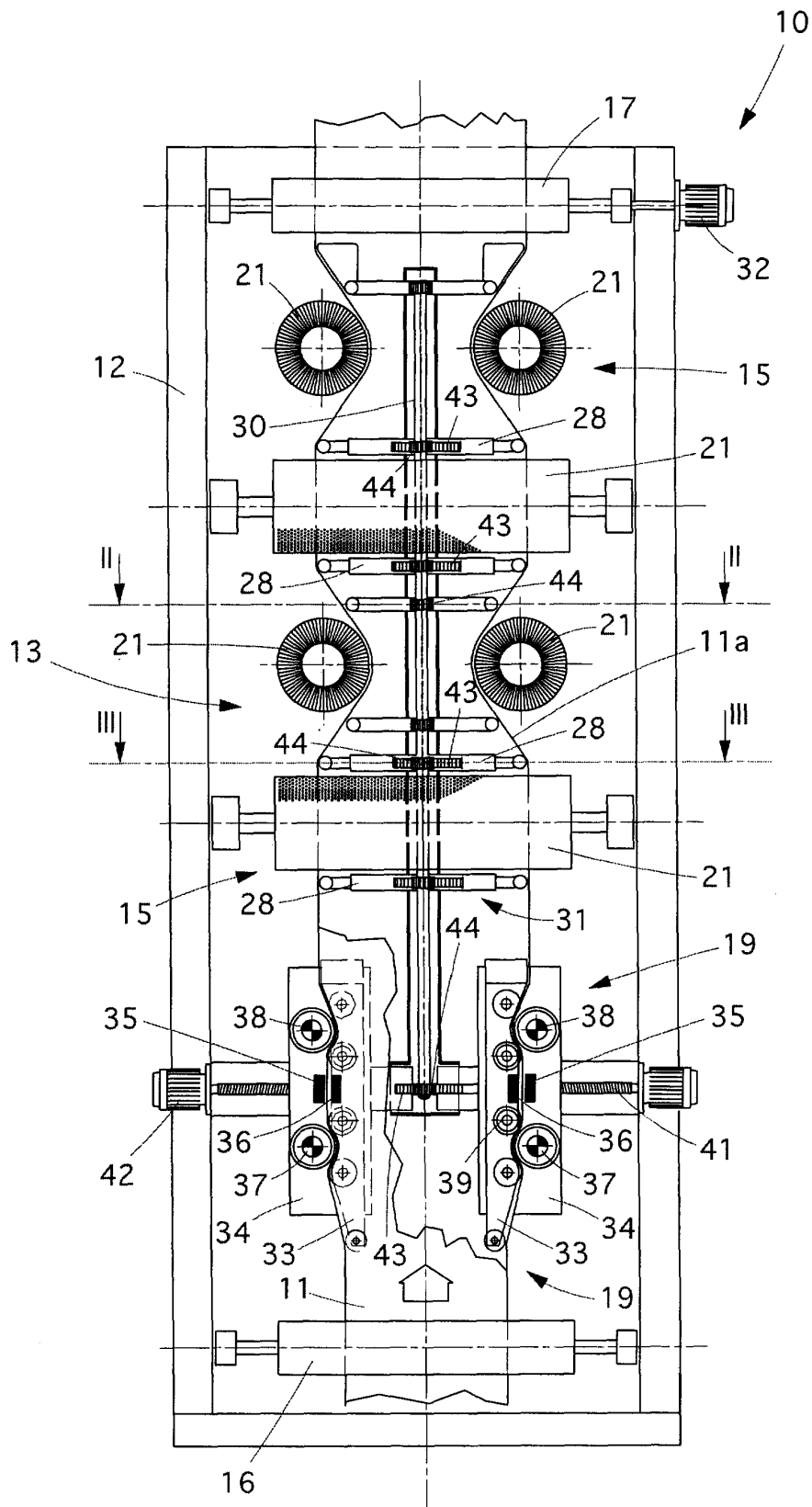


fig. 1

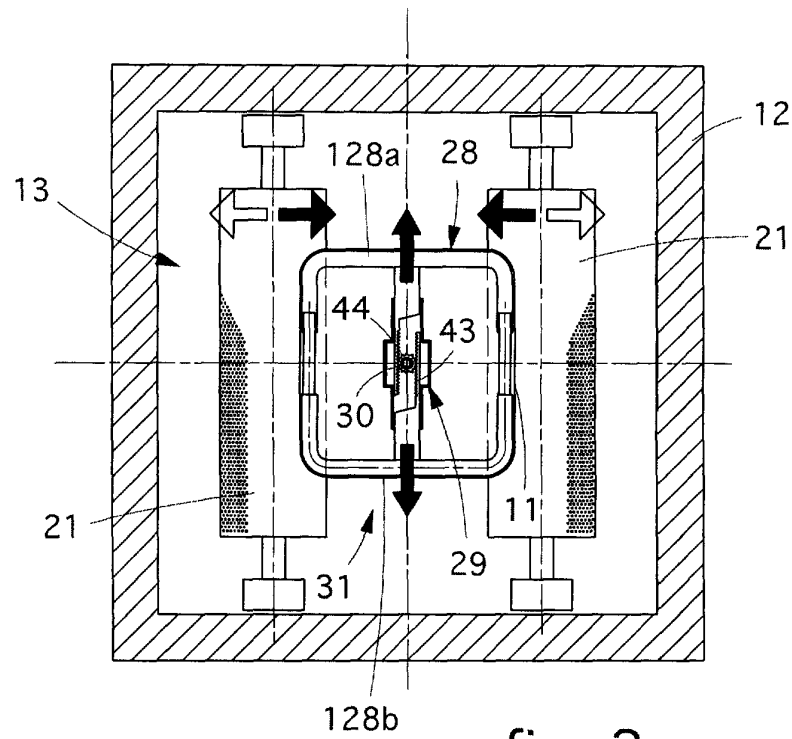


fig. 2

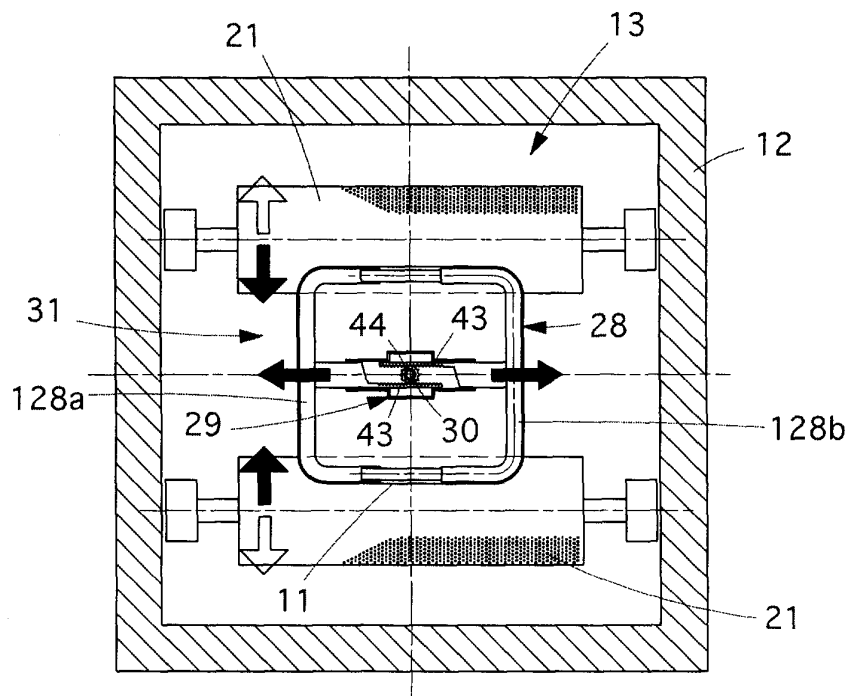


fig. 3

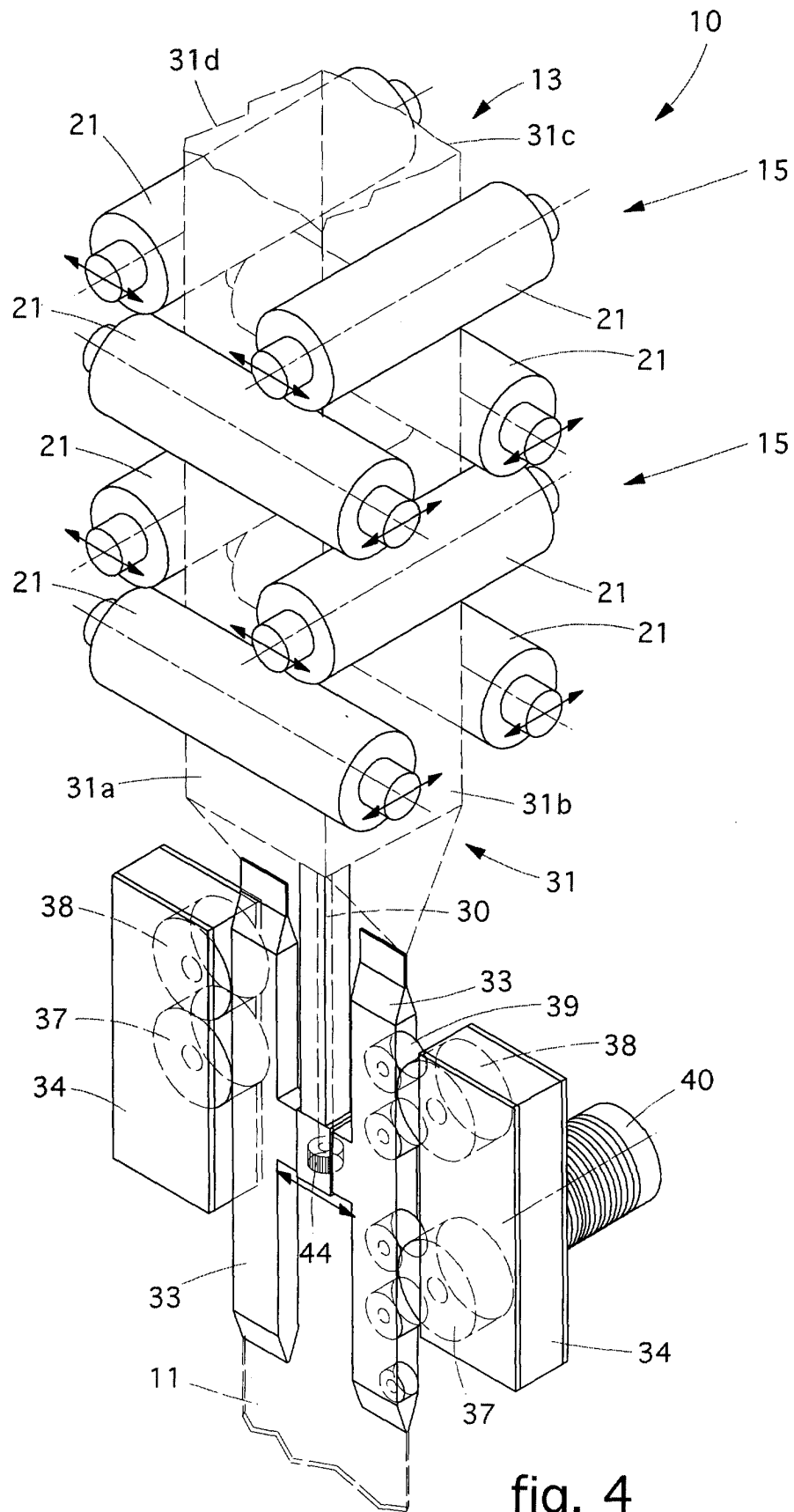


fig. 4

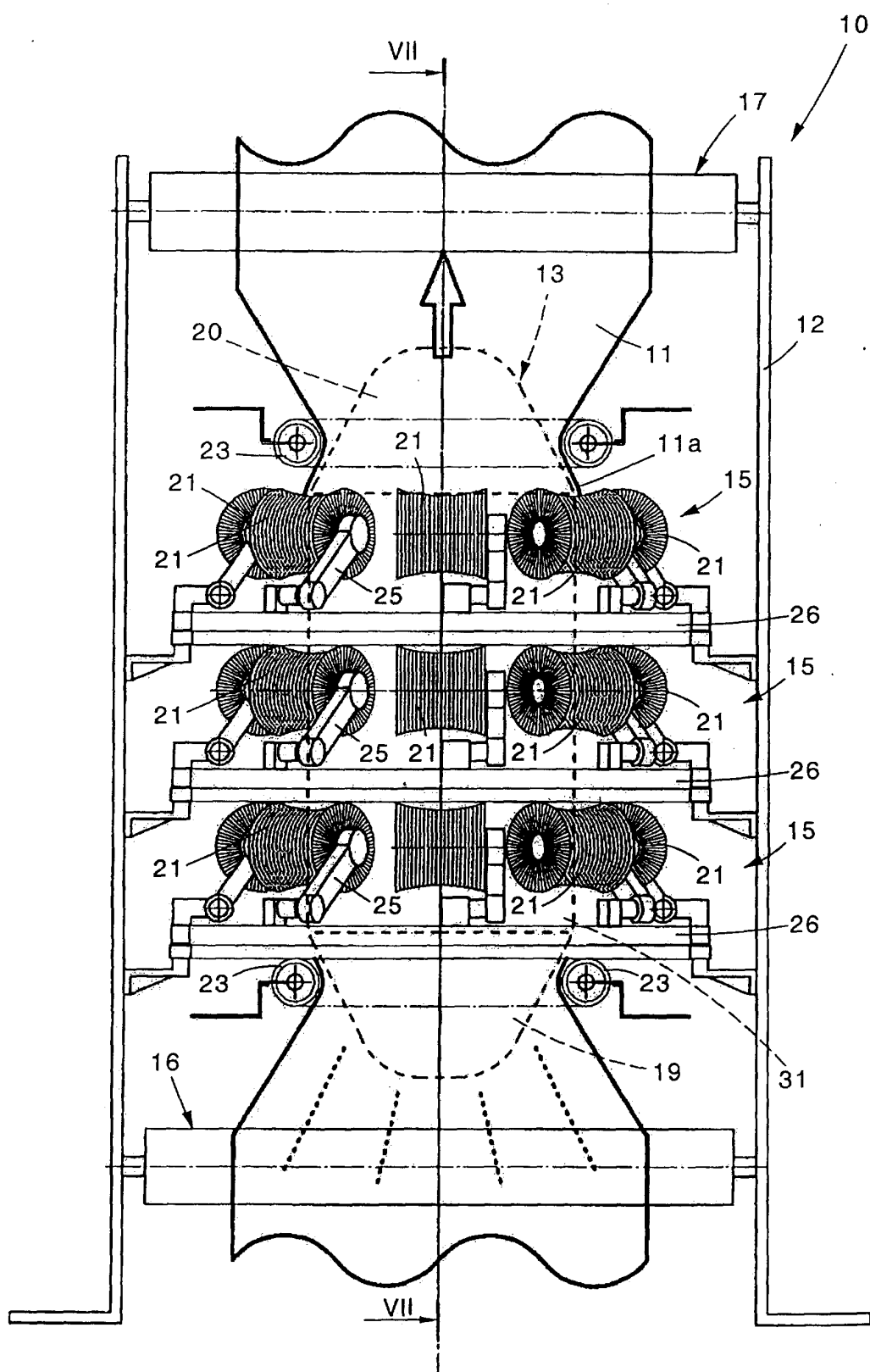
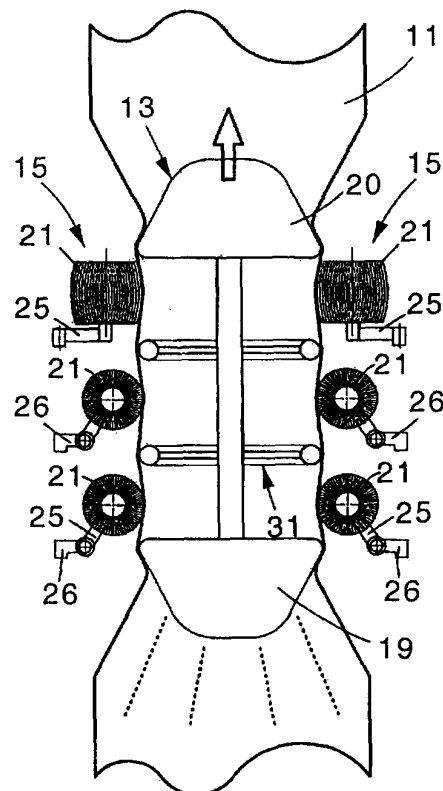
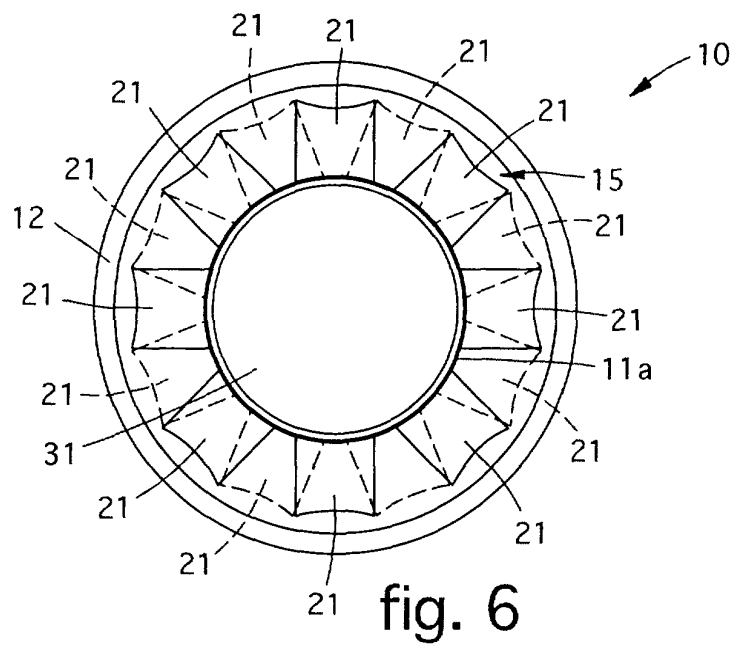


fig. 5





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 10 5072

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Place of search Munich		Date of completion of the search 25 January 2005	Examiner Bichi, M
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