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(54) **Device for aligning strings in a racquet**

(57) In a device for aligning strings in a racquet comprising a plate (10) with protrusions (20, 30, 40, 50) narrowing at the end, coming out of a flat top surface of the plate (10), the protrusions (20, 30, 40, 50) have such dimensions and shape that they fit spaces in between

the strings of the racquet. Each protrusion (20, 30, 40, 50) of this device has a cuboidal part (22, 32, 42, 52) with a base sitting on the flat top surface of the plate (10), whereby the cuboidal part (22, 32, 42, 52) turns upwards into a truncated pyramidal part (21, 31, 41, 51) with convex walls.

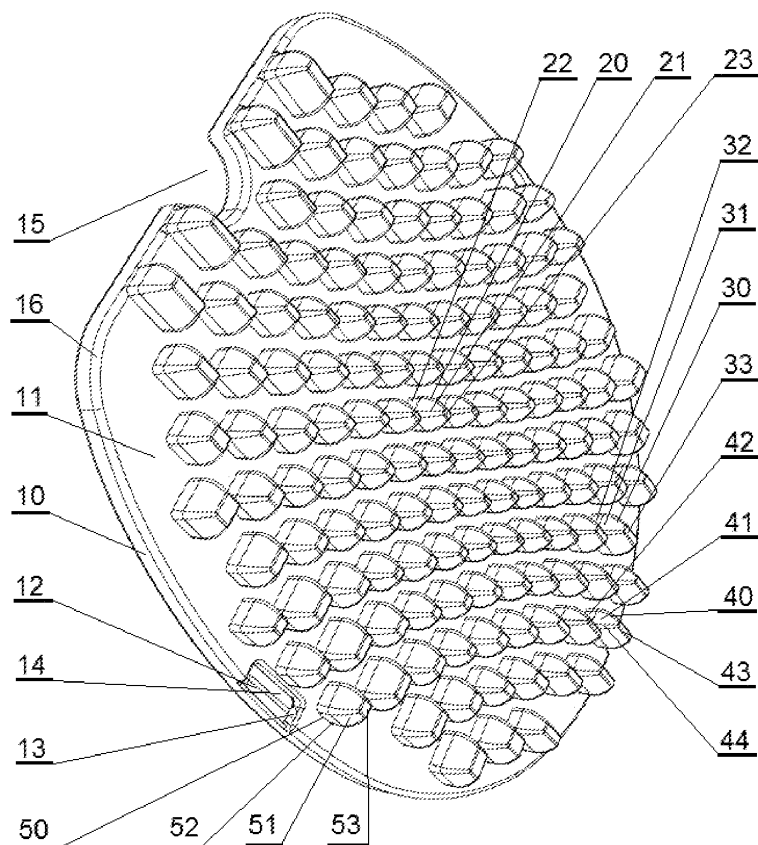


Fig. 1

Description

[0001] The invention relates to a device for aligning strings in a racquet, especially in a tennis or badminton racquet.

[0002] Shot precision in tennis or badminton depends not only on the string tension but also on the string alignment in a racquet. After every time a ball or a shuttlecock has been hit with a racquet, the strings move. Eventually the shift is substantial and hitting a ball or a shuttlecock is no longer precise. A solution that eliminates this kind of movement of the strings is known from the application description no. P- 287768 called "Strings, especially for tennis racquets", in which crossing horizontal and vertical strings are connected at points of junction. In the mentioned solution there is a problem with adjusting tension in individual strings.

[0003] There is a device known from the French application description no. FR 90 04878 A1 called "Dispositif pour rétablir l'équidistance entre les cordes du tamis d'une raquette" that creates equal distances in between racquet strings. This device consists of a plate with a handle, and attached convex elements, which align racquet strings in equal distances after they are placed in between the strings.

[0004] There is a string aligning device known from the German description no. DE 295 05 075 U1 pertaining to the utility model called "Vorrichtung für einem Schläger zum Ausrichten von verrutschten Saiten" that has a plate with spikes on the top of the plate. The distances in between the spikes are selected in such a way that the device can bring the shifted strings back to the original position after the spikes are inserted in between the strings.

[0005] There is a string aligning device known from the European application description no. EP 0 598 482 A2 pertaining to the solution called "Racquet string aligner" that consists of a plate with protruding elements. The plate is in a ball can cap shape and may be used as a cover for a typical can for tennis balls.

[0006] In the last three devices described above, regulating the distances between strings is very time consuming.

[0007] There is also a device known from the American patent description no. US 5,823,900 A called "Process and device for bringing into alignment the strings of an interlaced network" that is used to align tennis racquet string along a straight line. In order to set the strings easily, the device has half-elliptical, half-round or oval plates attached to a base plate, which impact the strings during their alignment. This device does not guarantee precise alignment of all strings. In addition, the forces that cause the strings to align are directed mainly at the points of junction. Because the strings are deteriorated mostly at these points of junction, the forces created by this device may cause the strings to break.

[0008] According to the invention, in the device for aligning strings in a racquet comprising a plate with pro-

trusions narrowing at the end, coming out of a flat top surface of the plate, the protrusions have such dimensions and shape that they fit spaces in between the strings of the racquet. Each protrusion has a cuboidal part with a base sitting on the flat top surface of the plate, whereby the cuboidal part turns upwards into a truncated pyramidal part with convex walls. It is advantageous that dimensions of the cuboidal part, which guarantees stable alignment, correspond to the dimensions of a net window, in which the appropriate protrusion is inserted. According to the invention the pyramidal part of every protrusion plays only a role of a guide during the process of inserting the device into net windows or string windows.

[0009] Advantageously, the protrusions are aligned in main rows along lengthwise lines situated parallel to main strings and in cross rows along crosswise lines situated parallel to cross strings, while the distance between side surfaces of the cuboidal parts of the protrusions of two neighboring main and cross rows are not smaller than thickness of strings. Especially, the distances at protrusion corners between facing side surfaces of protrusion of two neighboring main rows or cross rows, can be not smaller than the thickness of strings that means that the distances between facing side surfaces of protrusion should be from 1.5 mm to 2 mm.

[0010] Height of protrusions can be the same or the protrusions in the middle may be the tallest, and the rest of the protrusions may be shorter progressively towards edge of the device.

[0011] Advantageously, edges of protrusions are rounded.

[0012] Advantageously, protrusions are capped by top surfaces with rounded edges.

[0013] Advantageously, the plate has side handles, which are created by grooves with rectangular rounded through-hole.

[0014] The invention will now be described by way of example and with reference to the accompanying drawings in which:

Fig. 1 shows perspective view of a device for aligning strings, especially in tennis and badminton racquets; Fig. 2 shows the device for aligning strings in a racquet before the protrusions are placed in between the racquet strings; and

Fig. 3 shows the device for aligning strings in the racquet after placing protrusions in between the racquet strings.

[0015] A device for aligning strings in a racquet shown in Fig. 1 comprises a plate 10 with a flat surface 11, from which protrusions 20, 30, 40 and outermost protrusions 50 stick out. The protrusions 20, 30, 40 are positioned on the plate 10 in a way that, after putting the device together with a racquet 60 shown in Fig. 2 and Fig. 3, in an ideal situation, the symmetry axis of each and every protrusion aligns with the middle of a corresponding window 64 of an interlaced net of strings 61 created from

main strings 62 and intersecting with them cross strings 63. In reality, the position of the protrusions deviates from the ideal situation mentioned above because racquets differ. In the device shown in Fig. 2, the protrusions are positioned in main rows 18 aligned parallel with main strings, and simultaneously positioned in cross rows 17 aligned parallel with cross strings, and curved diagonal lines. The interlaced net windows 64 with inserted protrusions meet each other's corners, meaning that after inserting the protrusions into racquet net windows 64 the protrusions are placed in every second net window 64 in both: the main rows 18 and the cross rows 17. In the device shown in Fig. 1, 2 and Fig. 3, the distances at protrusion corners between facing side surfaces of protrusion of two neighboring main rows or cross rows, are not smaller than the thickness of strings. Currently, racquet strings are 1.15 mm to 1.4 mm thick. Therefore, the distances between facing side surfaces of protrusion should be from 1.5 mm to 2 mm. In case of universal devices, the distances between facing side surfaces of protrusion of two neighboring columns or rows may be from 1.6 mm to 1.8 mm. Generally, the distances between facing side surfaces of protrusion of two neighboring columns or rows should be greater than thickness of the strings by 0.05 mm to 1.0 mm. After the process of aligning strings is complete, the strings may touch the device top surface 10 or they may be very close to the top surface 10, from 0.1 to 0.5 mm away.

[0016] Because the greatest density of windows 64 is in the middle of the racquet, the greatest density of protrusions is also in the middle of the string aligning device. The protrusions 20 with the smallest base are in the middle of the device, and the protrusions 30, 40 with the biggest bases are placed on the outskirts of the device, excluding outermost protrusions 50, which are in proximity to side handles 12, which are formed by grooves 13 with rectangular rounded through-hole 14. Above mentioned grooves 13 facilitate separation of the device from a racquet after the process of string alignment is complete.

[0017] The shape of the plate 10 of the device that aligns strings in a racquet corresponds to a reduced interior hitting surface of a racquet head, inside which there is a net, called strings. Therefore, the shape of the plate 10 resembles an oval that is cut creating a straight line edge with a recess 15, which points in the direction of the racquet handle after the device is placed in the net windows. In Fig. 1, the straight line edge is parallel to the rows of protrusions. This kind of shape of the device allows to mount a vibration dampener, which is placed in the center below the last string, during the string aligning process.

[0018] Since the plate 10 is smaller in size than the interior hitting surface of a racquet head, it is possible to place the device that aligns strings in a racquet, with tapering protrusions placed in racquet net windows, even when the strings are shifted and net windows are distorted. Since the plate 10 is smaller in size than the interior

hitting surface of a racquet head, the device can be moved around enough so after preliminarily inserting the device into the net windows, there is a possibility of re-positioning the device so all strings get aligned as per racquet manufacturer's recommendation. The plate 10 has rounded edges 16 to prevent strings from breaking.

[0019] Each and every protrusion 20, 30, 40 and outermost protrusion 50 has a bottom part, called afterward a cuboidal part, correspondingly 22, 32, 42, 52, which is cuboidal shape with a rectangular base with rounded corners, and a top or upper part, called afterward a pyramidal part, correspondingly 21, 31, 41, 51, which is pyramid shape with rectangular base with rounded corners and convex walls capped by a top surface, correspondingly 23, 33, 43, 53, that may be flat, convex or concave with dull edges, for example rounded edges, or a combination of these surfaces. In other words, the cuboidal part 22, 32, 42, 52 has the base sitting on the flat top surface of the plate 10 and turns upwards into a truncated pyramidal part 21, 31, 41, 51 with convex walls. The top surface of the pyramid part is designed in a way so the device does not damage a racquet cover when a tennis racquet is placed in that cover. In one of embodiments, the protrusions 20, 30, 40, 50 are capped by top surfaces with rounded edges.

[0020] During the string aligning process, forces are equally distributed along the edges of the protrusion, because every protrusion has a cuboidal part and a pyramidal part with rounded edges, rectangular base and truncated top. Therefore, this invention is harmless to strings and guarantees stable alignment because of the cuboid part of the protrusions.

[0021] Top surfaces of the protrusions are basically at the same level, meaning that in one of the options the height of all protrusions 20, 30, 40, 50 is the same. The dimensions of the cuboidal part, which guarantees stable alignment, correspond to the dimensions of the net window, in which the appropriate protrusion is inserted. The cuboidal part of every protrusion turns into the truncated pyramidal part with a top surface, correspondingly 23, 33, 43, 53. The pyramidal part of every protrusion plays a role of a guide during the process of inserting the device into net windows or string windows.

[0022] In another option, the protrusions located in the middle of the device are taller in order to facilitate the process of inserting the protrusions into string windows of the racquet. Moving gradually toward the edges of the device, the protrusions get shorter; therefore the protrusions located on the outskirts of the device are the shortest.

[0023] Although only the protrusion 40 shows rounded edge 44, the edges of both the bottom part 22, 32, 42, 52 and the top part 21, 31, 41, 51 of every protrusion correspondingly 20, 30, 40, 50 are rounded, what prevents strings from breaking.

[0024] The device that aligns strings in a racquet may have a handle, which was not shown on any drawing, that is attached permanently to the plate 10 or a remov-

able handle with Velcro that may be placed in openings or rectangular rounded through-holes 14 of side handles 12.

[0025] While the present invention has been depicted, described, and is defined by reference to particular preferred embodiments of the invention, such references in the foregoing specification do not imply a limitation on the invention. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader scope of the invention. The presented preferred embodiments of the invention are exemplary only, and are not exhaustive of the scope of the invention.

Claims

1. A device for aligning strings in a racquet comprising a plate (10) with protrusions (20, 30, 40, 50) narrowing at the end, coming out of a flat top surface of the plate (10), whereby the protrusions (20, 30, 40, 50) have such dimensions and shape that they fit spaces in between the strings of the racquet **characterized in that** each protrusion (20, 30, 40, 50) has a cuboidal part (22, 32, 42, 52) with a base sitting on the flat top surface of the plate (10), whereby the cuboidal part (22, 32, 42, 52) turns upwards into a truncated pyramidal part (21, 31, 41, 51) with convex walls.
2. The device for aligning strings in a racquet according to claim 1, **characterised in that** the protrusions (20, 30, 40, 50) are aligned in main rows along lengthwise lines situating parallel to main strings and in cross rows along crosswise lines situating parallel to cross strings, while the distance between side surfaces of the cuboidal parts (22, 32, 42, 52) of the protrusions (20, 30, 40, 50) of two neighboring main and cross rows are not smaller than thickness of strings.
3. The device for aligning strings in a racquet according to claim 1, **characterised in that** height of protrusions (20, 30, 40, 50) is the same.
4. The device for aligning strings in a racquet according to claim 1, **characterised in that** the protrusions (20) located in middle of the device are the tallest whereas remaining protrusions (30, 40, 50) get shorter moving towards edges of the device.
5. The device for aligning strings in a racquet according to claim 1 or 2 or 3 or 4, **characterised in that** edges of protrusions (20, 30, 40, 50) are rounded.
6. The device for aligning strings in a racquet according to claim 1 or 2 or 3 or 4 or 5, **characterised in that** protrusions (20, 30, 40, 50) are capped by top surfaces (23, 33, 43, 53) with rounded edges.
7. The device for aligning strings in a racquet according to claim 1, **characterised in that** the plate (10) has side handles (12), which are created by grooves (13) with rectangular rounded through-hole (14).

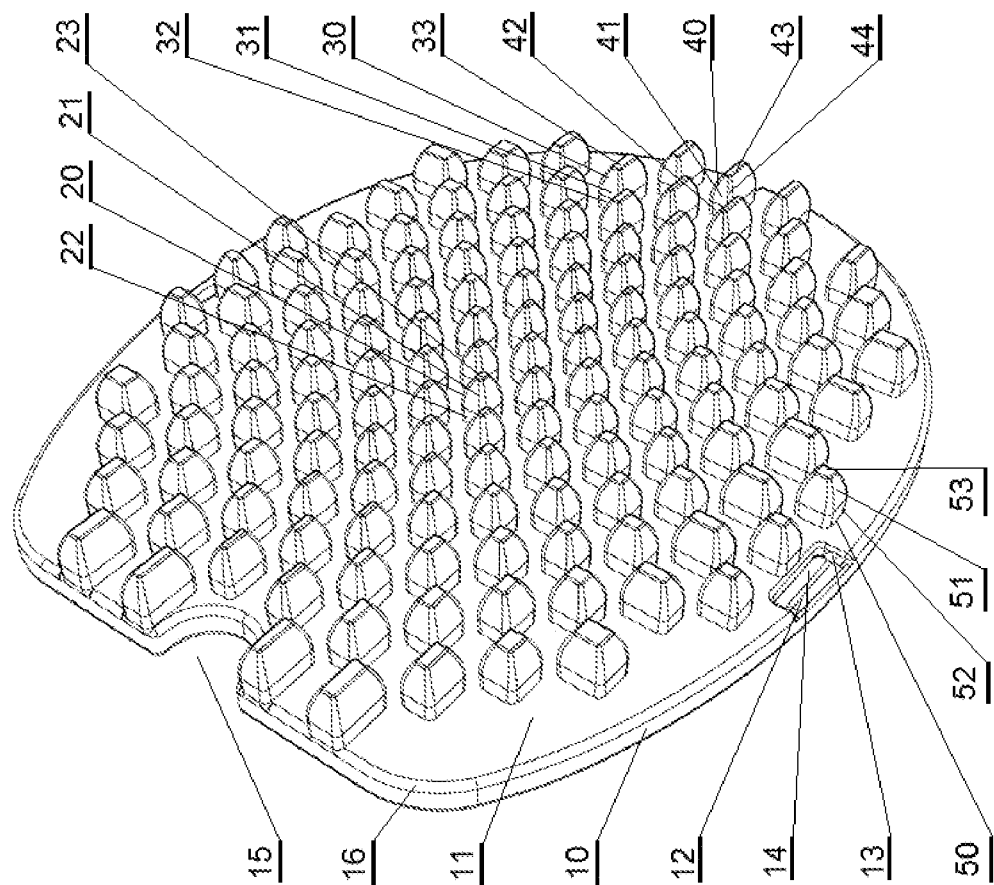


Fig. 1

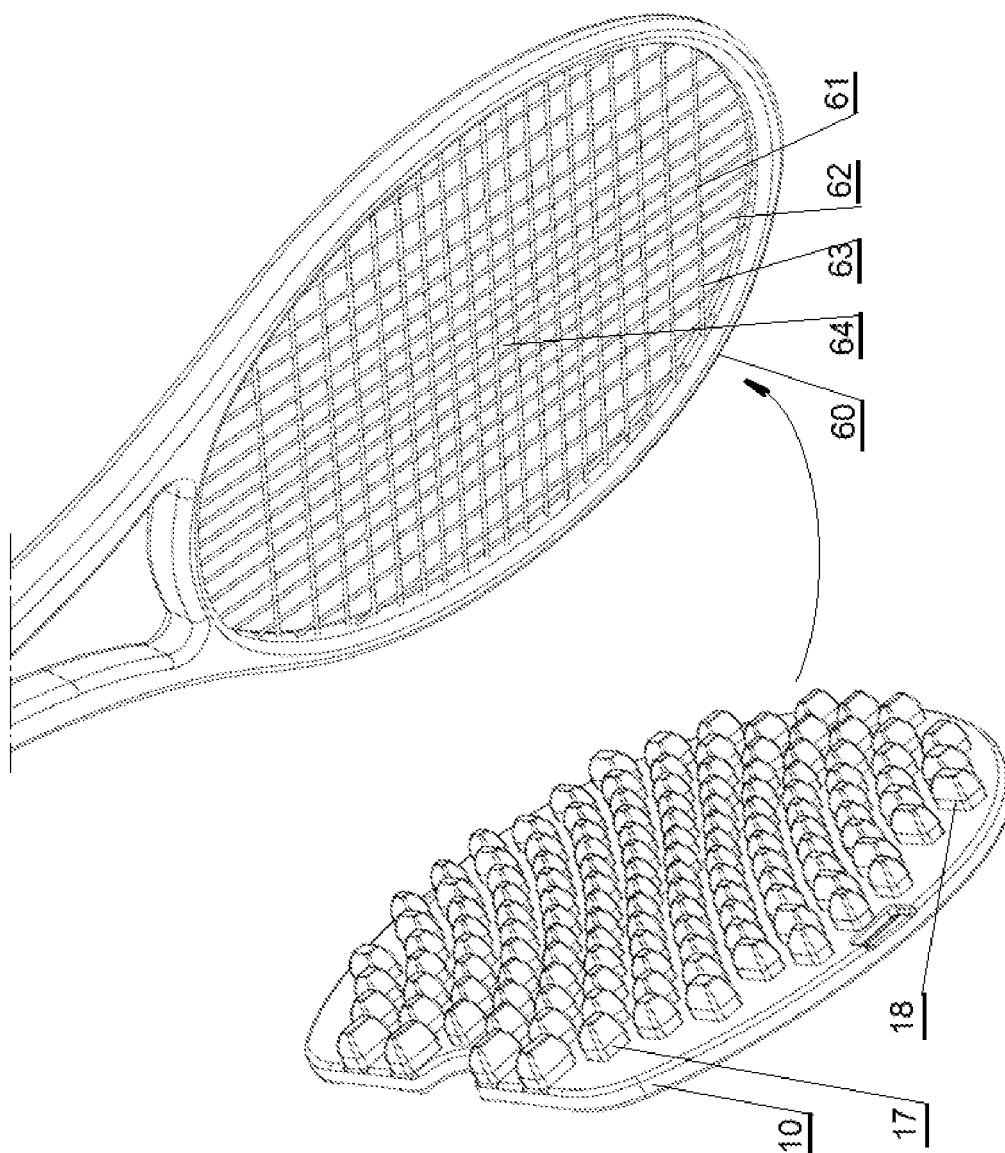


Fig. 2

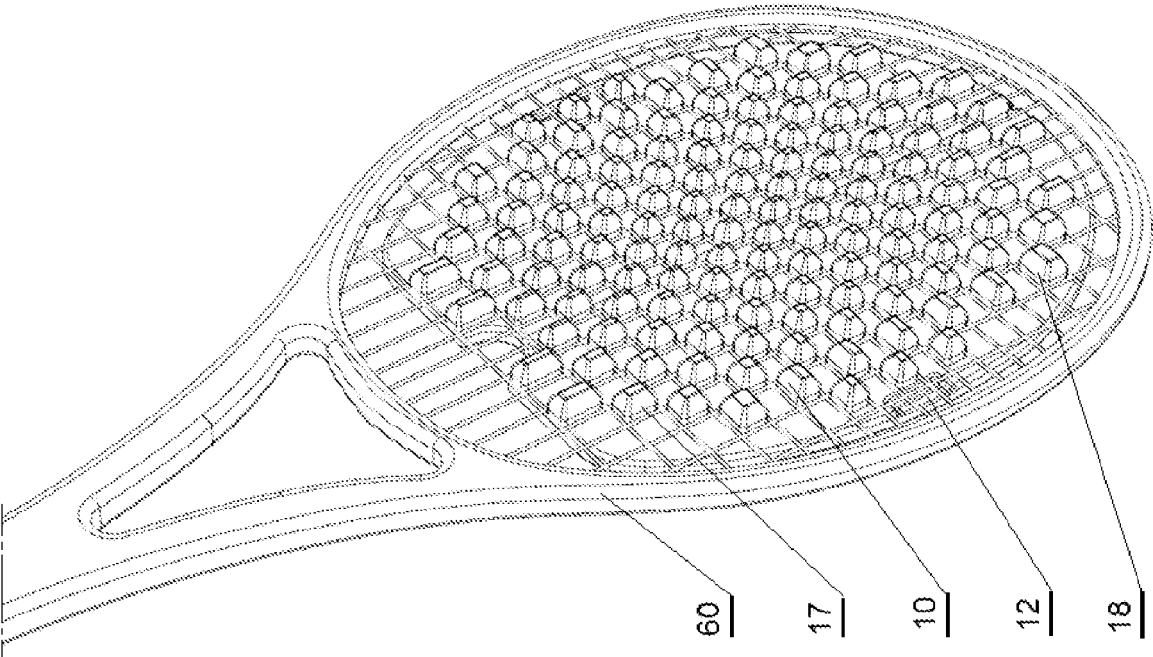


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 10 17 6304

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* column 2, line 22 - line 60; figures *	2-7	TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		10 January 2011	Lundblad, Hampus
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 17 6304

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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10-01-2011

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REFERENCES CITED IN THE DESCRIPTION

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