Abstract: The invention relates to a support for a mattress comprising a first plurality of first flexible slats for supporting the mattress, the first slats being curved and having a connecting unit provided at or near the middle of at least part of the slats for connecting the slats to a bed frame such that in use, the concave side of the curve of the slats is facing upward and a bed system comprising such mattress support. By providing the slats with a connecting element at or near the middle of slats such that in use, the concave side of the slats is facing upward, the extremities of the slats are not rigidly in contact with a bed frame. In this way, also resilience is also provided at the sides of the mattress support.
Support for a mattress and bed comprising such support

FIELD OF THE INVENTION
The invention relates to the field of mattress supports and in particular to mattress supports for beds, comprising a plurality of slats.

BACKGROUND OF THE INVENTION
Conventional mattress supports comprise a plurality of interconnected slats. The slats are either straight or curved. In case the slats are curved, they designed to be used with extremities being fixed to a rigid bed frame or resting on a rigid bed frame. The curve is in use located such that the middle of the slats is located higher than the extremities, i.e. the convex side of the slats is facing upwards. In this way, the mattress support provides resilience and with that, user comfort, in the middle of the mattress support. At the sides of the mattress support, no resilience is provided. At the sides, the slats are rigidly in contact with a bed frame, usually as they are resting on a ledge of the bed frame. This results in non optimal user comfort.

OBJECT AND SUMMARY OF THE INVENTION
Providing a mattress support that provides more resilience at the sides of the support would be preferred.

The invention provides in first aspect a support for a mattress, comprising a first plurality of first flexible slats for supporting the mattress, the first slats being curved and having a connecting unit provided at or near the middle of at least part of the first slats for connecting the first slats to a bed frame such that in use, the concave side the first slats is facing upward.

By providing the slats with a connecting element at or near the middle of slats such that in use, the concave side of the slats is facing upward, the extremities of the slats are not rigidly in contact with a bed frame. In this way, also resilience is also provided at the sides of the mattress support. And in particular with a mattress having a relatively rigid underside, resilience is also provided in the middle of the mattress as pressure of for example a human body in the middle in the mattress would benefit from resilience of both extremities of the slats.

In an embodiment of the support according to the invention, the support further comprises a second plurality of second slats, connected to the first slats in parallel via
the connecting unit, thus forming pairs of first slats and second slats, the second
slats being curved and connected to the first slats such that in use, the convex side of
the second slats is facing upward.

By providing a second plurality of slats, additional resilience is provided. Furthermore,
with the convex side of the second slat facing upward, the support can be used on bed
frames where conventional mattress support comprising slats can be used on.

In another embodiment of the support according to the invention, the connecting unit
comprises for at least a part of the pairs of slats two connecting elements provided on
both sides of the middle of the slats for rigidly spacing apart the first slats and the
second slats, the connecting elements being movable along at least a part of the length
of the pairs of slats.

By moving the connecting elements, the resilience of the support can be adjusted.
Resilience is provided as the first slats and the second slats facing one another with
their convex sides can move to one another under pressure of for example a mattress.
By rigidly spacing apart the first slats and the second slats, the parts of the slats that
can move to one another is reduced. In this way, resilience of the support is reduced.

By making the connecting elements movable, resilience can be adjusted.

In a further embodiment of the support according to the invention, the slats comprise
two first curves having substantially the same angle, each first curve being provided on
either side of the middle of the slats and two second curves having substantially the
same angle, each second curve being located between a closest first curves and a
closest extremity of the slats, wherein the two first curves have directions that are
opposite to directions of the second curves.

By providing the first curves and the second curves, the overall curved nature of the
slats is preserved; the curve is further articulated. Starting with a slat with a concave
side facing upward, under pressure of a mattress placed on the support, part of the slats
between the first two curves and the second curves is longer, viewed from above. This
is because this part is initially diagonal and is bent in a more horizontal way.
Furthermore, a part of the slats between the second curves and the extremities is
shorter, viewed from above. This is because these parts of the slats are bent in a more
diagonal way than the initial position. With these two opposite deformations, the total
length of the slats, viewed from above, is deformed less than in case for example only a single curve would be provided.

Yet another embodiment of the support according to the invention comprises a web connecting opposite extremities of the first slats, the web being provided on the first slats. An advantage of this embodiment is that a mattress with a non-resilient bottom can be better supported by the support.

Yet a further embodiment of the support according to the invention comprises flexible web connecting elements provided at opposite extremities of the first slats, the web connecting elements connecting the web to the first slats. This provides more flexibility to the support and with that, increased user comfort.

The invention provides in a second aspect a bed comprising the support as claimed by any of the claims 1 through 14.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The invention and embodiments thereof will now be further discussed by means of Figures. In the Figures:

Figure 1: shows a cross section of an embodiment of the support according to the invention;

Figure 2: shows a top view of an embodiment of the support according to the invention;

Figure 3: shows a cross section of a further embodiment of the support according to the invention;

Figure 4 A: shows a cross section of another embodiment of the support according to the invention;

Figure 4 B: shows a cross section of another embodiment of the support according to the invention with pressure applied to it;

Figure 4 C: shows a top view of a pair of slat for another embodiment of the support according to the invention, including a connecting element; and
Figure 4 D: shows a three dimensional view of another embodiment of the support according to the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 1 shows a cross section bed system 190. The bed system 190 comprises a mattress 170, a bed frame comprising a bridging element 152 connecting at least two legs 154 and a mattress support comprising a multitude of slats 100 connected to a beam 150 by a connecting element 108. The connecting element 108 is provided such that the slats 100 can be connected to the beam 150 such that the concave side of the slats 100 is facing upward. The connecting element 108 can be embodied as a nut-and-bolt system, screws, nails, rivets, other connecting means or a combination thereof. This includes custom designed connection means like caps fitting over the slats 100 that are subsequently fitted in the beam 150. The beam 150 is connected to or part of the bed frame. On either side of the bed frame optional sideboards 156 are provided. The sideboards 156 are primarily provided for aesthetic purposes, though the sideboard 156 also provides support for tucking in sheets and blankets and for dust protection of the underside of the bed system 190.

Figure 2 shows a top view of the mattress support; the slats 100 are connected on the beam 150 in parallel to one another. The slats 100 are connected to the beam 150 in a substantial perpendicular orientation with respect to the beam 150. Figure 2 shows the slats 100 being connected to the beam 150 at equal distances between two slats 100. Alternatively, the spacing between the slats 100 may be varied depending on preferences of a user of the bed system 190. For example, where the torso of the user is intended to lie, the spacing between the slats 100 may be reduced to provide more support for this heavier part of the body. On the other hand, the spacing between the slats 100 may be increased where lighter parts of the body like legs are intended to lie.

The slats 100 are made from a flexible and elastic or resilient material. Wood is a preferred material, though other materials like steel and various types of plastics or combinations thereof can be used as well. The slats 100 are curved such that the extremities of the slats 100 are in the bed system 190 located higher than the middle parts of the slats 100, meaning the concave side is facing upward. The mattress 170 is supported by the extremities of the slats 100. In this way, the slats 100 provide resilient support to the whole mattress 170 instead of only the centre.
If the user of the bed system 190 is located on the left side of the mattress 170, the left side of the slats 100 will bend down by virtue of the resilient nature of the slats 100. If a user of the bed system 190 is located on the right side of the mattress 170, primarily the right side of the slats 100 will bend down and provide resilient support. If the user is locate in the middle of the mattress 170, both sides of the slats 100 will bend down and provide resilient support. So by providing slats with upwardly curved extremities and only connecting the slats to the rest of the bed system in the middle of the slats 100, resilience and therefore comfort will be provided independent from the location of the user on the mattress 170.

Figure 3 shows another bed system 195. The bed system 195 comprises a mattress 170, a bed frame comprising a bridging element 152 connecting at least two legs 154 and a mattress support comprising a multitude of upper slats 102 and a multitude of lower slats 104. The upper slats 102 and the lower slats 104 are connected by a connecting element 106, forming pairs of upper slats 102 and lower slats 104. The connecting element 106 can be embodied in various ways, including, but not limited to nuts and bolts, nails, glue, screws, other or a combination thereof. The pairs of slats are connected to the bridging element 152 to provide a stable construction of the bed frame and the mattress support. Legs 154 are provided to support the bridging element 152.

Alternatively, the bridging element 152 is connected to the legs 154 at mid-height of the legs 154. In that embodiment, the pairs of slats are connected to the bed frame by connecting the lower slats 104 to the top side of the legs 154. The connection between the bed frame and mattress support can be embodied in various ways, including, but not limited to nuts and bolts, nails, glue, screws, rivets, other or a combination thereof.

The pairs of upper slats 102 and lower slats 104 may for example be interconnected by sharing one and the same connecting element 106. The connecting element 106 may for this purpose be embodied as either a rigid or a flexible element and either elastic or non-elastic, depending on design preferences and requirements and user preferences.

The upper slats 102 have extremities that are curved upwardly and the lower slats 104 are curved downwardly. In this way, additional resilience is provided by the mattress support that is formed by the pairs of upper slats 102 and lower slats 104, increasing comfort provided to a user of the bed system 195.
Figure 4 A and Figure 4 B show a cross-section of a more enhanced bed system 400. Figure 4 C shows an upper view of a part of the bed system 400 and Figure 4 D shows a three-dimensional view of the bed system 400. Figure 4 A, Figure 4 B, Figure 4 C and Figure 4 D will be discussed in conjunction. The bed system 400 comprises at least one bridging element 152 to which on either side side beams 158 are connected. The bed system 400 may comprise multiple bridging elements 152 for connecting the side beams 158. The bridging elements 152 and the side beams 158 form a bed frame on which a support for a mattress is placed.

The mattress support comprises a plurality of lower slats 404 and a plurality of upper slats 402, grouped in pairs comprising a lower slat 404 and an upper slat 402, thus forming pairs of slats. The upper slats 402 and the lower slats 404 are curved on multiple locations. At either side of the middle of the upper slats 402, first curves are provided, having an upward direction. Between the upward curves and the extremities of the upper slats 402, second curves are provided with a downward direction, so curves with a direction opposite to that of the first curves.

The multitude of curves results in providing the upper slats 402 with a general curve or curvature with a concave side facing upward with the upper slats 402 connected to the bed frame. Analogously, the multitude of curves results in providing the lower slats 404 with a general curve or curvature with a convex side facing upward with the lower slats 404 connected to the bed frame.

At either side of the middle of the lower slats 404, first curves are provided, having a downward direction. Between the downward curves and the extremities of the lower slats 404, second curves are provided with an upward direction, so curves with a direction opposite to that of the first curves.

By providing curves with opposite directions, the outer dimensions of the mattress support do not change substantially when the extremities of the slats are bent to provide resilient support to a mattress support by the mattress support. With pressure being put on the extremities of the upper slat 402, the extremities will move downward. This will result in the diagonal parts of the upper slat 402 between the first curves and the second curves to have a more horizontal orientation, which means that these parts of the upper slat 402 will be longer, viewed from the top.
In addition, the horizontal parts of the upper slat 402 between the second curves and the extremities of the upper slat 402 will have a more diagonal position. This means that these parts of the upper slat 402 will be shorter, viewed from the top. These two effects of a first part of the slats being shorter and a second part of the slats being longer compensate one another, which means that the overall dimensions of the mattress support will vary less than in case only one curve is provided on either side of the middle of the upper slat 402. This is illustrated in Figure 4 B.

In an advantageous embodiment, the magnitude of the first curves is substantially the same as that of the second curves. With this configuration, the broadening - viewed from the top - of the part between the two curves due to bending is compensated by narrowing - viewed from the top - of the part between the second curves and the extremities. As also the part between the first curve of the upper slat 402 and the middle of the upper slat 402, the compensation may not be full; other magnitudes of the curves may be selected for optimal compensation.

The lower slats 404 and the upper slats 402 are connected by a fixed connecting element 406 and two adjustable connecting elements 420. The fixed connecting element 406 provides a spacer between the upper slats 402 and the lower slats 404 and is preferably connected by means of a nut-and-bolt system 408. A person skilled in the art will appreciated that various other well known fixation means may be used additionally or alternatively. In another embodiment, the adjustable connecting elements 420 are omitted. In an alternative embodiment, the fixed connecting element 406 is omitted and at least some functionality of the fixed connecting element is fulfilled by the adjustable connecting element 420.

Individual connecting elements 406 are provided on a per-pair basis. Alternatively, the connecting element 406 is shared by multiple pairs of upper slats 402 and lower slats 404. In this case, the connecting element 406 is provided as an elongated element. This elongated element may be rigid or flexible and elastic or non-elastic, depending on the function it needs to fulfil. In case the elongated element is required to provide stability and rigidity for holding the pairs of slats properly together, a rigid element is required. If the elongated element is only required for holding the pairs of slats together without a need for rigidity, a flexible element may be used, for example comprising non-elastic textile.
The adjustable connecting elements 420 each comprise a shaft 422 extending through slits 428 in the upper slats 402 and lower slats 403. The slits 428 in the upper slats 402 and the slits 428 in the lower slats 404 are aligned. The adjustable connecting elements 420 further comprise a spacing element 424 provided between the lower slats 404 and the upper slats 402 through which the shaft 422 protrudes. At both ends of the shaft 422, capping ends 426 are provided to keep the adjustable connecting elements 420 connected to the upper slats 402 and the lower slats 404.

The capping ends can be embodied in several ways. In one embodiment, the shafts 422 are provided with threaded ends and the capping ends 426 comprise nuts screwed on the threads of the shafts 422. Additionally, flanges may be applied on the shafts 422 as well. Alternatively, the capping ends 426 are omitted and the shafts 422 do not extend beyond the upper side of the upper slats 402 on one hand and do not extend beyond the lower side of the lower slats 404.

By sliding the adjustable connecting elements 420 through the slits 428, the resilience of the pair of slats can be adjusted. The spacing element 424 inhibits bending of upper slat 402 and the lower slat 404 relative to one another. The upper slat 402 and the lower slat 404 are rigidly connected between the left connecting element 420 and the right connecting element. In addition, a relatively rigid part of the pair of slats is created. By moving the adjustable connecting elements 420 away from the fixed connecting element 406, the resilience of the pair of slats is decreased. By moving the spacing element 424 towards an extremity of the slats, the slats are rigidly connected over a larger area. As a result, resilience of the pair of slats is decreased. By moving the adjustable connecting elements 420 towards the fixed connecting element, the resilience of the pair of slats is increased.

To better facilitate movement of the adjustable connecting elements 420, an adjustment rod 432 with a handling knob 434 is provided. Using the adjustment rod 432 to move the adjustable connecting element 420 towards or away from the fixed connecting element 406, the user does not need to put his or her hand and arm between the upper slat 402 and the lower slat 404. This is not only more convenient, but also reduces the risk for injury in case of a hand getting stuck between the upper slats 402 and the lower slats 404.

Preferably, each pair of upper slats 402 and lower slats 404 is provided with a pair of adjustable connecting elements 420. The adjustable connecting elements 420 can be
adjusted individually. Alternatively, multiple adjustable connecting elements 420 are coupled and can be actuated in a group with one adjustment rod 432. This enables controlling rigidity of the mattress support in zones, for example a head zone, an upper torso zone, a lower torso zone and a leg zone or other multiple zones. In yet another alternatively, only rigidity of a specific zone can be adjusted by providing the adjustable connecting elements only on pairs of slats on that part of the mattress support.

Alternatively to providing the adjustment rods 432, electromechanical actuating means may be provided for adjusting the position of the adjustable connecting elements 420. For example, an electromotor driving a gear engaging with a rack may be used to electromechanically adjust the positions the adjustable connecting elements.

Alternatively, other arrangements may be used that perform a function equivalent to that of the adjustable connecting elements 420. In one alternative, slidable sleeves are provided around the upper slat 402 and the lower slat 404, the sleeves also comprising a spacer between the upper slat 402 and the lower slat 404 to inhibit movement of the slats between the location of the sleeve and the middle of the slats at the location of the fixed connecting element 406.

Figure 4 D provides a three dimensional view of the bed frame and the mattress support. Figure 4 D shows the bed frame in a slightly different configuration than Figure 4 A, with the side beams 158 supported by legs 154. The legs 154 are interconnected by bridging elements 152 parallel to the pairs of slats and lower beams 454 perpendicular to the pairs of slats. The pairs of slats are connected to the bed frame by providing slat connecting elements 442 at the end of the lower slats 404. The slat connecting elements 442 enable the lower slats 404 to be properly connected to the side beams 158. In this embodiment, the slat connecting elements 442 are caps that are fit over the extremities of the lower slats 404. Opposite to the opening of the slat connecting elements in which the extremities of the slat connecting elements 442 are fit, a protrusion 444 is provided to connect the connecting element 442 to the side beam 158. In particular, the lower slats 404 rest on the side beams 158 via the protrusion 444.

A mattress can be placed directly on top of the upper slat 402. However, if the mattress is not very rigid or has at least a bottom that is not very rigid, the mattress may bend and follow the curves of the upper slat 402. This would yield a bent instead of a straight mattress upper side, which does not contribute to the sleeping comfort of the user of the mattress and mattress support. Therefore, a velum 412 is provided, overspanning the
upper slat 402 from the left extremity to the right extremity of the upper slat 402. The velum 412 is a web of flexible though not necessarily resilient material, provided in woven, knit or non-woven materials of any suitable material. By tightly spanning the velum 412 and by using a non-resilient material, the velum 412 will remain tightly spanned over the upper slat 402.

In a preferred embodiment, the velum 412 is provided in a point-elastic resilient material that enables air and other fluids to easily pass through. The passing through of air and other fluids is preferred to a mattress supported by the mattress support breath and in particular to let any humidity building up in the mattress during sleep evaporate from the mattress. With the velum 412 being point elastic is meant that applying a force on velum 412 at a small area will result in an indentation in the velum 412 at only a small area. The rest of the velum 412 will remain in the same position as before the force had been applied. Without a force applied, the velum 412 has a planar form.

The velum 412 is preferably provided as a sheet connecting multiple upper slats 402 in a parallel configuration, equivalent to the configuration depicted by Figure 2. Alternatively, multiple velum 412 are provided, providing one velum 412 per upper slat 402. In yet another alternative, one velum 412 connects a group of upper slats 402 such that a mattress support is provided comprising various groups of pairs of upper slats 402 and lower slats 404 that are connected by the velum 412 connected to the upper side of upper slats 402.

Providing the velum 412 in non-resilient material is particularly suitable on top of the upper slats 402 with two pairs of curves because deformation of the upper slat 402 is compensated by providing two curves of opposite directions, as discussed before. To compensate for any deformation of the upper slat 402, in particular with respect to the lateral dimensions of the upper slat 402 and to compensate for suspension of the velum 412 in the middle of the velum 412, velum connecting elements 414 are provided between the velum 412 and the upper slats 402. Preferably, the velum connecting elements 414 are provided in a flexible material to compensate for any deformation of the upper slats 412 not compensated by the opposite curves and to compensate for suspension of the velum 412.

Preferably, the velum connecting elements 414 are provided in a triangular form as depicted by Figure 4. In Figure 4, the base line of the triangular cross-section is parallel to the length of the upper slat 402. The top of the triangular cross-section is above the
middle of the base, though this is all but essential. The triangular form ensures a relatively broad footprint for properly affixing the velum connecting elements 414 to the upper surface of the upper slats 402. In addition, the triangular form provides a relatively narrow top that due to the narrower form provides resilience to compensate for any deformations mentioned or other deformations.

Preferably, the velum connecting elements 414 are hollow, increasing resilience of the velum connecting elements 414. In this configuration, but also in a solid configuration of the velum connecting elements 414, the velum connecting elements 414 can be formed also in other forms than a triangular form, like a rectangular, oblong, circular or other form. The velum connecting elements 414 can be provided in natural rubber, synthetic rubber like silicon rubber, other resilient and/or elastic materials or a combination thereof.

So far, the application of the velum 412 to the mattress support has only been discussed in conjunction with the configuration as depicted by Figure 4 A. It is noted that the velum 412 may also be applied to the configuration as depicted by Figure 1. Additionally, it is noted that though the configuration as depicted by Figure 1 discloses a slat having only one curve on either side of the middle of the slat, this slat with a single set of curves can be replaced by a slat having two sets of curves like the upper slat 402 as depicted by Figure 4 A.

Expressions such as "comprise", "include", "incorporate", "contain", "is" and "have" are to be construed in a non-exclusive manner when interpreting the description and its associated claims, namely construed to allow for other items or components which are not explicitly defined also to be present. Reference to the singular is also to be construed in be a reference to the plural and vice versa.

In the description above, it will be understood that when an element such as layer, region, object or substrate is referred to as being "on", "onto" or "connected to" another element, the element is either directly on or connected to the other element, or intervening elements may also be present.

Furthermore, the invention may also be embodied with less components than provided in the embodiments described here, wherein one component carries out multiple functions. Just as well may the invention be embodied using more elements than
depicted in Figure 1, wherein functions carried out by one component in the embodiment provided are distributed over multiple components.

A person skilled in the art will readily appreciate that various parameters disclosed in the description may be modified and that various embodiments disclosed and/or claimed may be combined without departing from the scope of the invention.

It is stipulated that the reference signs in the claims do not limit the scope of the claims, but are merely inserted to enhance the legibility of the claims.
Claims:

1. Support for a mattress, comprising a first plurality of first flexible slats for supporting the mattress, the first slats being curved and having a connecting unit provided at or near the middle of at least part of the first slats for connecting the first slats to a bed frame such that in use, the concave side the first slats is facing upward.

2. Support as claimed by claim 1, further comprising a second plurality of second slats, connected to the first slats in parallel via the connecting unit, thus forming pairs of first slats and second slats, the second slats being curved and connected to the first slats such that in use, the convex side of the second slats is facing upward.

3. Support as claimed by claim 2, the first slats comprising a substantially straight part in the middle of the first slats and the second slats comprising a substantially straight part in the middle of the second slats and the first slats and the second slats being connected at or near the middle of the straight parts by the connecting unit such that the first slats and the second slats are spaced away from one another.

4. Support as claimed by claim 2, the connecting unit comprising for at least a part of the pairs of slats two connecting elements provided on both sides of the middle of the slats for rigidly spacing apart the first slats and the second slats, the connecting elements being movable along at least a part of the length of the pairs of slats.

5. Support as claimed by claim 4, the slats comprising slits in the substantially straight parts on both sides of the middle of the slats, the slits in the first slats being aligned with the slits in the second slats and the connecting elements comprising protrusions provided on opposite sides of the connecting elements, the protrusions protruding though the slits.

6. Support as claimed by any of the preceding claims, wherein the slats comprise:
   - two first curves having substantially the same angle, each first curve being provided on either side of the middle of the slats; and
   - two second curves having substantially the same angle, each second curve being located between a closest first curve and a closest extremity of the slats;
wherein the two first curves have directions that are opposite to directions of the second curves.

7. Support as claimed by claim 6, wherein the two first curves have angles that have substantially the same magnitude as the two second curves.

8. Support as claimed by any of the preceding claims, further comprising a web connecting opposite extremities of the first slats, the web being provided on the first slats.

9. Support as claimed by claim 8, the web being connected to multiple first slats such that the first slats are located in parallel to one another.

10. Support as claimed by claim 8, further comprising flexible web connecting elements provided at opposite extremities of the first slats, the web connecting elements connecting the web to the first slats.

11. Support as claimed by claim 10, wherein the web connecting elements have a triangular cross-section and the web connecting elements are connected to the slats such that a horizontal base of the web connecting elements is parallel to the length of the first slats

12. Support as claimed by claim 10, wherein the web connecting elements are hollow.

13. Support as claimed by any of the preceding claims, further comprising at least one elongated element and the first slats being connected to the elongated element in parallel to one another and with a substantially perpendicular orientation with respect to the elongated element.

14. Support as claimed by claim 13, wherein the first slats are connected to the elongated element via a second plurality of second slats, connected to the first slats in parallel, thus forming pairs of first slats and second slats, the second slats being curved such that in use, the convex side of the second slats is facing upward.

15. Bed comprising the support as claimed by any of the preceding claims.
INTERNATIONAL SEARCH REPORT

PCT/NL2011/050865

A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant to claim No.</th>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

*A* document defining the general state of the art which is not considered to be of particular relevance

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*Z* document member of the same patent family

Date of the actual completion of the international search

20 February 2012

Date of mailing of the international search report

05/03/2012

Name and mailing address of the ISA:

European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk

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MacCormick, Duncan

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