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Purpose Pocket Spring Cotbed Mattress, available at
<http://www.johnlewis.com/john-lewis-dual-purpose-pocket-spring-cotbed-mattress-140-x-70cm/p1019364>;
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(58) Field of Search:
INT CL A47C, A47D
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(54) Title of the Invention: **Mattress**
Abstract Title: **A child mattress with different softness levels on each side**

(57) A child mattress comprising first 101 and second 102 spring layers separated by a core layer 105 wherein the first spring layer is softer than the second one. The springs in each layer may have different spring constants, may be individually pocketed and may be made of steel wire with a specific diameter. The core layer 105 may be rigid to decouple the spring layers 101 and 102 and be made of a closed cell foam or coir heat bonded with polyester or nylon. Further outer foam 106 and cover layers 107 may be provided. The device is designed so that the softer side can be used for younger children and then flipped to use the firmer side for older ones.

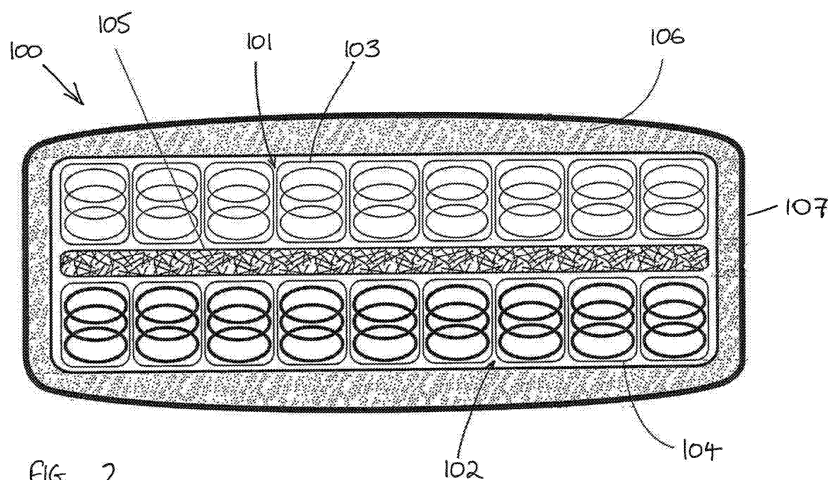
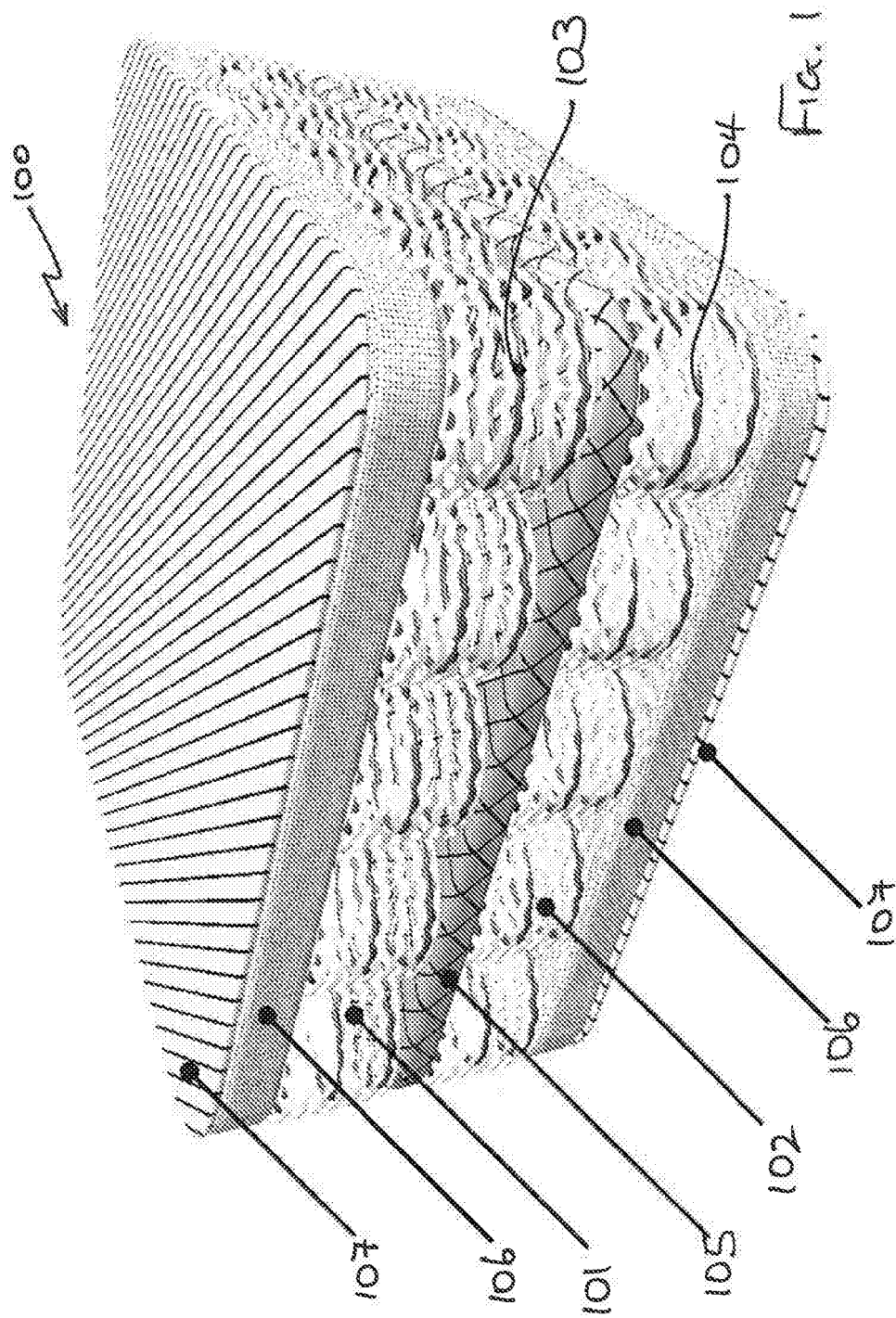


FIG. 2



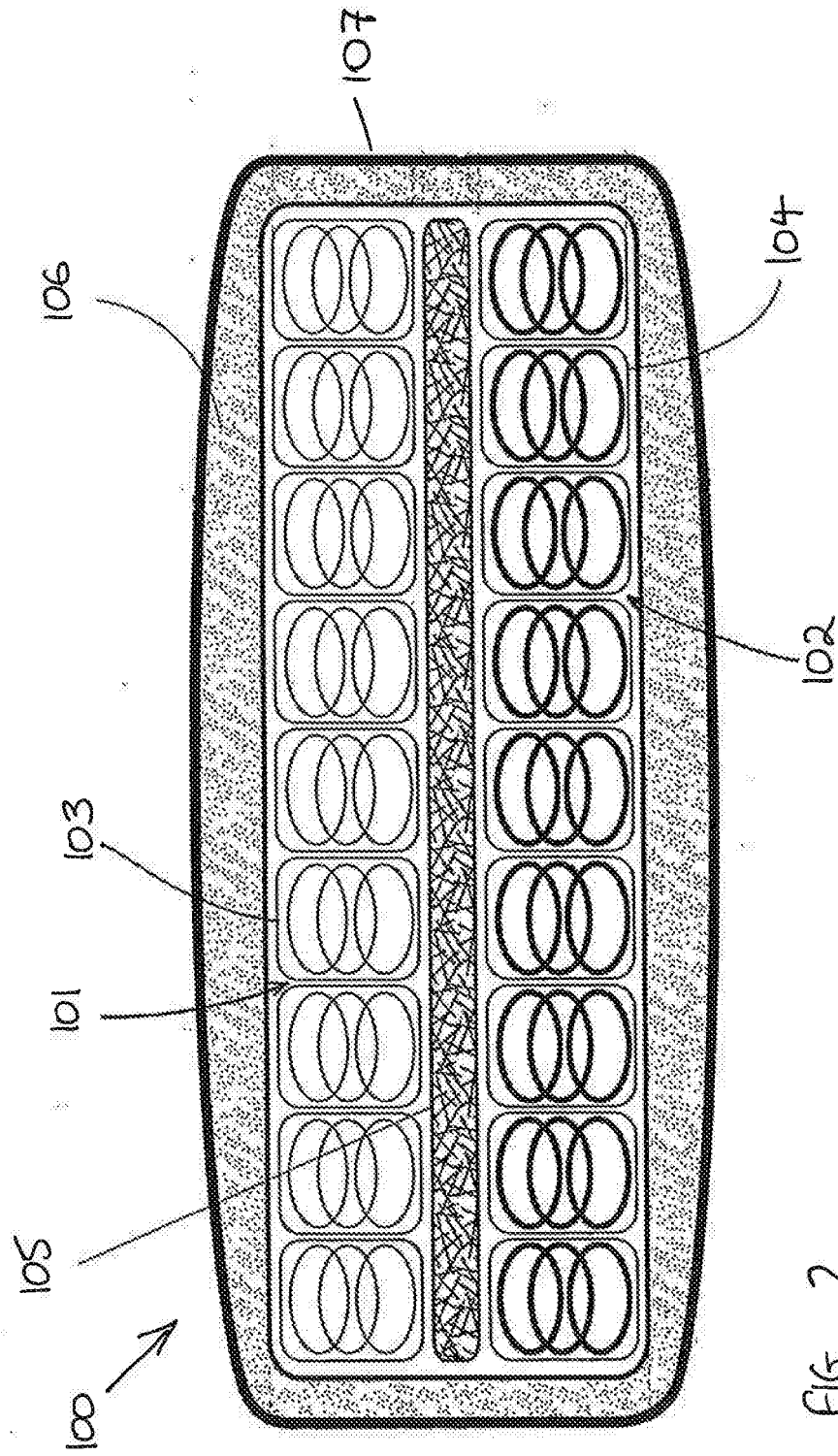


FIG. 2

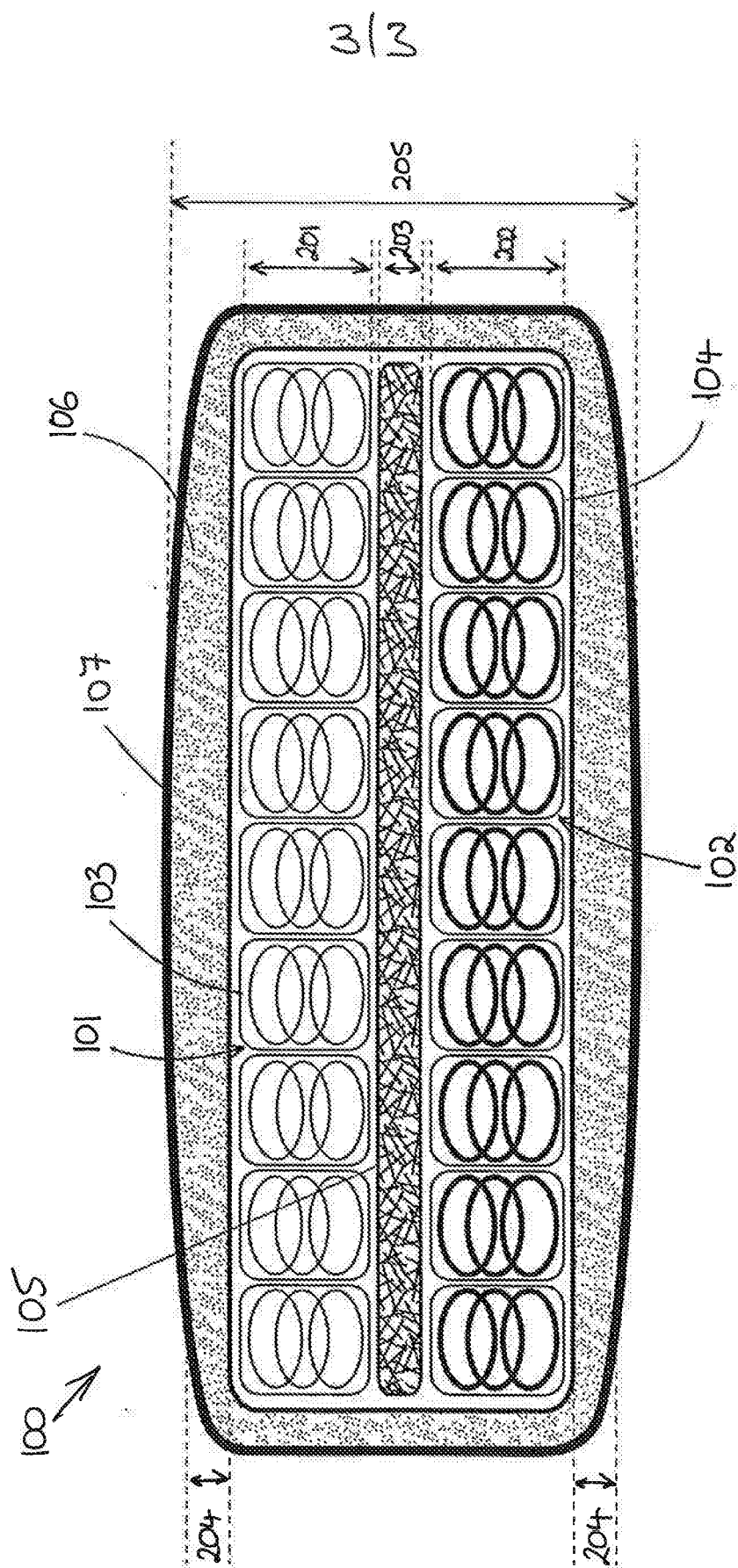


FIG. 3

MATTRESS

The present invention relates to mattresses. In particular it relates to mattresses suitable for babies, infants and children.

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Traditionally, as a baby grows up, it moves from sleeping in a cot to sleeping in a conventional bed. A cot mattress should be soft in comparison with a bed mattress to avoid damage to the developing bone structure of the child, such as flattening of the skull (positional plagiocephaly). A bed mattress is then firm in comparison with a cot mattress
10 in order to provide good support for the child as their weight grows.

However, in recent years, there has been an increase in demand for cots which are convertible into beds as the child grows up, so that the expense of buying both may be avoided. Although the frame may be convertible, typically the mattress must be replaced.

15 A solution to this problem was proposed in GB2489246, which discloses a mattress comprising two core sections: one relatively soft and the other relatively firm, with the soft layer comprising, for example, formed polyurethane, polyester fibre or wool and the firm layer comprising, for example, pocketed springs.

20 However, foam is not as durable as other materials and, in the context of developing a mattress having longer utility during a child's growth and development, there is a need for alternative constructions. Standards requirements place limitations on the maximum thickness of a child's mattress and this impacts on the transposition of developments in adult mattresses to children's mattresses.

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Accordingly, in its broadest sense, the present invention provides a mattress comprising first and second spring layers separated by a core layer, wherein the first spring layer is softer than the second spring layer.

Typically, each spring layer comprises a plurality or array of springs, which are preferably individually pocketed. Suitably, the pockets are formed of a non-woven or woven polypropylene material.

- 5 The first spring layer is softer or less firm than the second spring layer, in order to provide a mattress with two sides of differing softness. In one embodiment, the springs in the first spring layer are arranged at a different spring density from the springs in the second spring layer. In preferred embodiments, the springs of the first spring layer have a lower spring constant than the springs of the second spring layer.

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Preferably, the springs in each layer are constructed from steel wire having a diameter substantially between 1.0 mm and 1.9 mm. More preferably, the steel wire used for the springs in the first spring layer is between about 1.5 mm and 1.7 mm, or about 1.6 mm, in diameter, and the steel wire used for the springs in the second spring layer is between
15 about 1.6 mm and 1.8 mm, or about 1.7 mm, in diameter.

Preferably, the core layer is a semi-rigid core layer

- 20 Suitably, the core layer comprises a foam layer, preferably formed from a closed cell foam. Advantageously the foam layer is a relatively hard foam formed from a polyether material.

- 25 Preferably, the core layer is formed from a coir-based composition. More preferably, the coir core layer is formed from a latex and coir composition or a heat-bonded polyester or nylon and coir composition.

- Preferably, the mattress further comprises a comfort layer surrounding both spring layers and the core layer. Suitably, the comfort layer is a foam layer, preferably an open-cell foam.

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Preferably, the mattress further comprises a cover layer over the comfort layer.

The above and other aspects of the present invention will now be described in further detail, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective sectional view of an embodiment of a mattress in accordance
5 with the present invention;

Figure 2 is a cross-sectional view of an embodiment of a mattress in accordance with the present invention; and

10 Figure 3 is the view of Figure 2 giving typical dimensions of the mattress layers.

The figures show an embodiment of a child mattress 100 in accordance with the present invention. The mattress 100 comprises a first spring layer 101 and a second spring layer
15 102. First spring layer 101 comprises pocketed springs 103 and second spring layer 102 comprises pocketed springs 104. The pocketed springs in the first spring layer 101 are selected to provide a softer firmness to those of the second spring layer 102, suitably by having a lower spring constant than those in second spring layer 102. A core layer 105 is positioned between the two spring layers to decouple the two sets of springs. A foam
20 layer 106 is provided around the mattress to increase comfort and the whole mattress provided with a cover layer 107.

Specific typical dimensions of a mattress suitable for use as a child's mattress are given in Figure 3. Length 201 is the depth of the first spring section and is typically about 4
25 cm. Length 202 is the depth of the second spring sections, again typically about 4 cm. The thickness or depth 203 of the core layer is typically 1.5 cm. The optional foam layer 106 has a typical depth 204 of 1.5 cm. As mentioned above, the maximum depth 205 of the mattress in the centre is required by British Standard BS 1877-10:2011 (and its equivalents in other countries) to be no greater than 125mm and no greater than 100mm
30 around the edge of the mattress. It will be appreciated by the person skilled in the art that all of these dimensions may be varied within the scope of the invention.

The springs of both layers are typically about 40 mm in height and are constructed from steel wire, individually encased in pockets formed of a non-woven polypropylene fabric. The adjacent pockets are then joined, for example by heat-welding, to form a spring layer.

5 The spring constant for each spring is determined by the thickness of the steel wire from which the spring is formed and the diameter of the spring. Springs having a diameter of about 48 mm have been found to be particularly suitable for a child's mattress. Preferably, springs having that diameter have a wire thickness within the range of 1.0 mm to 1.9 mm. In preferred embodiments, springs with a wire thickness of about 1.6
10 mm are used for the soft side of the mattress and 1.7 mm for the firm side of the mattress. Other absolute thicknesses and differential thickness are also suitable. Furthermore the person skilled in the art will appreciate that alternative spring types to steel springs may be used and are within the scope of the invention. Likewise, the skilled person will appreciate that alternative materials for the pockets of the springs may be
15 used and will be within the scope of the invention.

The purpose of the core layer is to provide a degree of isolation or decoupling of the two spring layers from each another in order that they can function as individual layers each with a predetermined (and different) firmness. In the absence of the core layer, the
20 mattress would tend to function as if there were a single sprung core, as the springs of the two layers would tend to act in series with each another. The core layer also acts to prevent the mattress from bending or twisting whilst in transit, during which time it is sometimes stored upright.

25 The core layer is therefore semi-rigid, preferably of sufficient rigidity or stiffness to isolate the springs of the first and second spring layers from one another. This in effect involves preventing the transmission of force from one spring directly to a neighbouring spring in the other layer. Transmission will, of course, still occur, but the relatively stiff core layer acts to spread the transmission over a larger area. The core layer should also preferably
30 allow for a degree of flexibility so that the mattress as a whole can flex to a degree similar to standard mattresses.

In preferred embodiments, the core layer comprises a sheet formed from or including coir. Coir is derived from the husk of coconuts and can provide the core layer with the rigidity required and a degree of flexibility. Coir can be formed into semi-rigid sheets by bonding with latex or by heat-bonding with polyester or nylon. Coir, being a natural resource is preferred to synthetic materials.

Bonding coir with latex can have a tendency, however, to produce a product which is too soft and flexible when formed as a thin sheet. It may become permanently deformed over time which creates a hollow in the cot mattress and which can be dangerous if the vomit from a child pools and creates a choking hazard. This permanent deformation is referred to as "taking a set". This phenomenon does not occur if there is sufficient thickness to the coir sheet. Typically a thickness of 80 mm or above avoids this problem. However, as mentioned above, the overall thickness of a child's mattress is laid down by British Standards, and cannot be more than 100mm at the edge and not more than 125mm in the middle. Therefore, when combined with twin layers of springs, the core layer must be relatively thin in order that the mattress complies with the standard for overall mattress thickness whilst allowing a sufficient spring layer thickness to provide adequate comfort.

Advantageously, therefore, an alternative method of making a coir sheet is therefore used in preferred embodiments of the present invention. This method comprises the use of very thin layers of coir and polyester adhered together. As an alternative, nylon may be used in the place of polyester. This creates a relatively rigid coir sheet which is less likely to take a set, and also gives a firmer base against which the springs can bear.

The person skilled in the art will appreciate that other materials may be used for the core layer, such as relatively hard foams such as polyether foams.

In use, the mattress may be turned either so as to place the softer first spring layer uppermost or alternatively so as to place the firmer second spring layer uppermost. The former arrangement is appropriate for babies and very young children, who require a softer surface to sleep on. The latter arrangement is appropriate for older children.

CLAIMS

1. A child mattress comprising first and second spring layers separated by a core layer, wherein the first spring layer is softer than the second spring layer.
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2. A mattress as claimed in claim 1 wherein each spring layer comprises a plurality of springs and wherein the springs of the first spring layer have a lower spring constant than the springs of the second spring layer.
- 10 3. A mattress as claimed in claim 2 wherein the springs of each layer are individually pocketed.
4. A mattress as claimed in claim 2 or 3 wherein the springs of each layer are constructed using steel wire of a diameter substantially between 1.0 mm and 1.9 mm.
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5. A mattress as claimed in claim 4 wherein the steel wire used for the springs in the first spring layer is between about 1.5 mm and 1.7 mm in diameter, preferably about 1.6 mm
- 20 6. A mattress as claimed in claim 4 or 5 wherein the steel wire used for the springs in the second spring layer is between about 1.6 mm and 1.8 mm in diameter, preferably about 1.7 mm.
7. A mattress as claimed in any preceding claim wherein the core layer has a firmness
25 sufficient to decouple the springs of the first and second spring layers from one another.
8. A mattress as claimed in any preceding claim wherein the core layer is made from a relatively rigid material.
- 30 9. A mattress as claimed in any preceding claim wherein the core layer comprises a foam layer, preferably a closed cell foam.

10. A mattress as claimed in any one of claims 1 to 8 wherein the core layer is formed of a coir-based material.

11. A mattress as claimed in claim 11 wherein the coir-based material is a layer
5 material formed from coir heat-bonded with polyester or nylon.

12. A mattress as claimed in any preceding claim further comprising a foam layer enveloping both spring layers and the core layer.

10 13. A mattress as claimed in claim 12, further comprising a cover layer over the foam layer.

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Examiner: Daniel Cox

Claims searched: 1-13

Date of search: 10 September 2014

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-3, 7, 8, 10 and 11	EP1201164 A1 WILLIAMS, See whole document
X	1-3, 7, 8 10 and 11	US2004/025256 A1 MOSSBECK, See whole document
X	1-8 and 10-13	US2010/317930 A1 OEXMAN, See whole document
X	1-3, 7, 8, 10 and 11	GB2128082 A HUTCHINGS, See whole document
X	1-3, 7, 8 and 10-13	US2011/010249 A1 OEXMAN (2), See whole document
X	1-3, 7, 8, 10 and 11	US1703587 A KRAFT, See whole document
X	1-3, 7, 8, 10 and 11	JP2009131645 A KRAFT, See whole document
X	1-13	GB2489426 A VAN DER VELDE, See whole document
X	1-13	John Lewis website advertising the John Lewis Dual Purpose Pocket Spring Cotbed Mattress, available at http://www.johnlewis.com/john-lewis-dual-purpose-pocket-spring-cotbed-mattress-140-x-70cm/p1019364 ; Viewed 10/09/2014

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

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Worldwide search of patent documents classified in the following areas of the IPC

A47C; A47D

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI and internet

International Classification:

Subclass	Subgroup	Valid From
A47D	0015/00	01/01/2006
A47C	0023/04	01/01/2006