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DE 003838351 A1 US 6027463 A
US 2917043 A

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(54) Abstract Title: **Vibrating mattresses**

(57) The present invention relates to vibrating mattresses. A vibrating mattress is generally aimed at encouraging a child to sleep. The mattress of the present invention employs sound-activated vibration wherein vibration is automatically initiated once detected sound reaches a threshold level - thereby eliminating the need for manual operation of a mattress during the night. Conventional vibrating mattresses are controlled manually using switches located on or around the mattress. These switches can, in some cases, be difficult to access - if the mattress is used within a cot, for example. Sound-activated vibrating mattresses have previously been proposed. The present invention provides an improved mattress that enables a sound threshold to be selected by a user in order to meet the requirements of a particular child or a particular situation. The present invention further provides for an irregular pattern of vibration within a mattress.

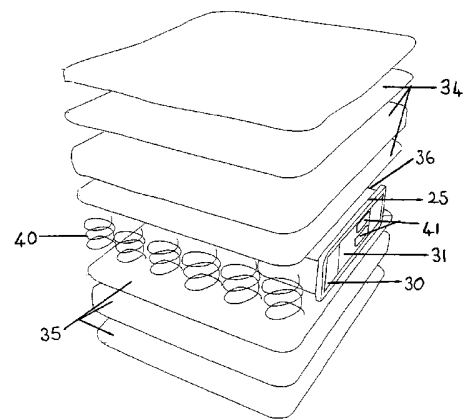


Figure 3

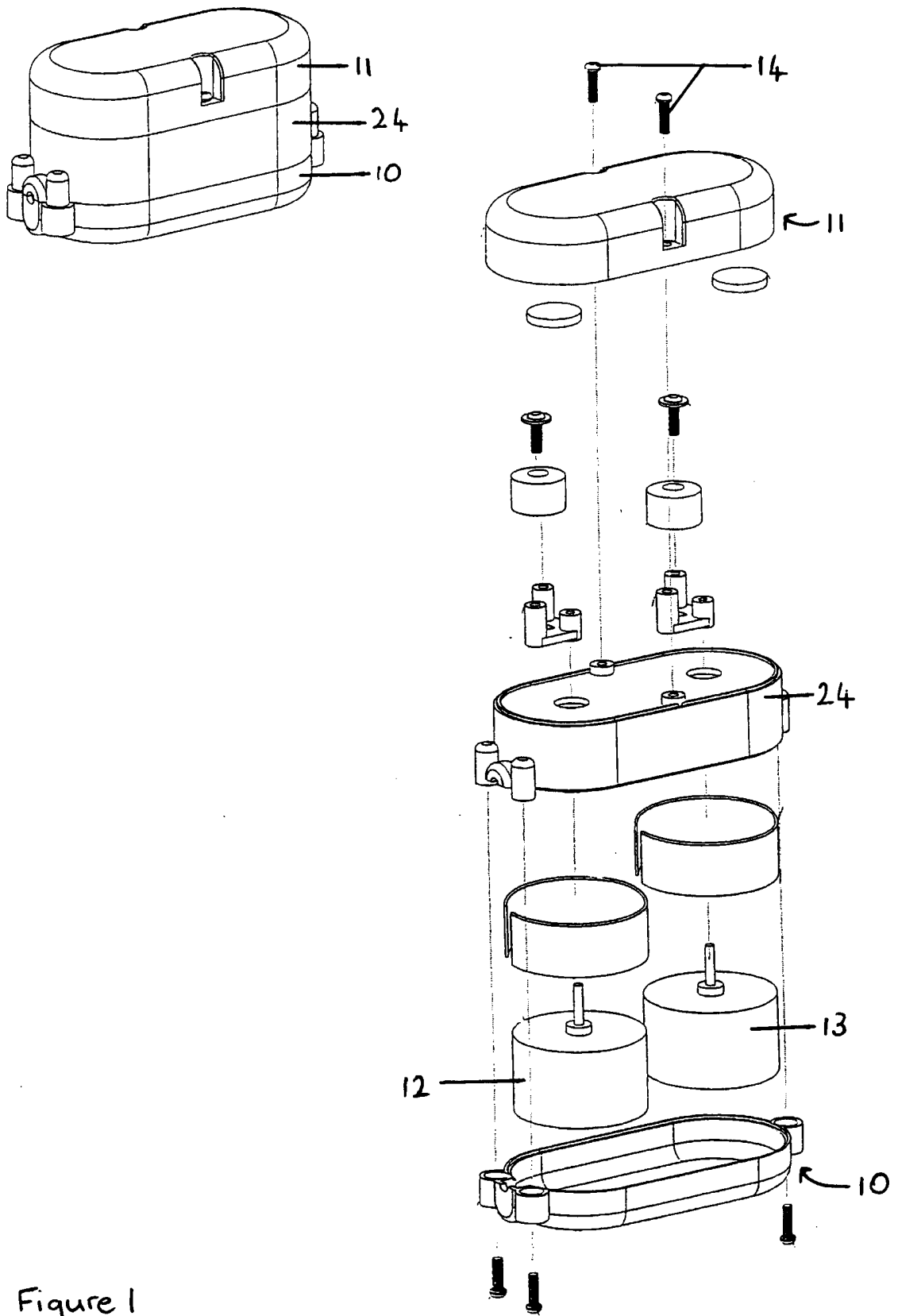
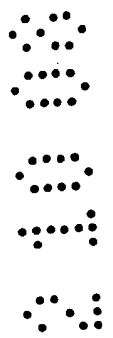


Figure 1



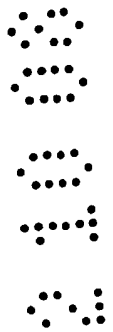
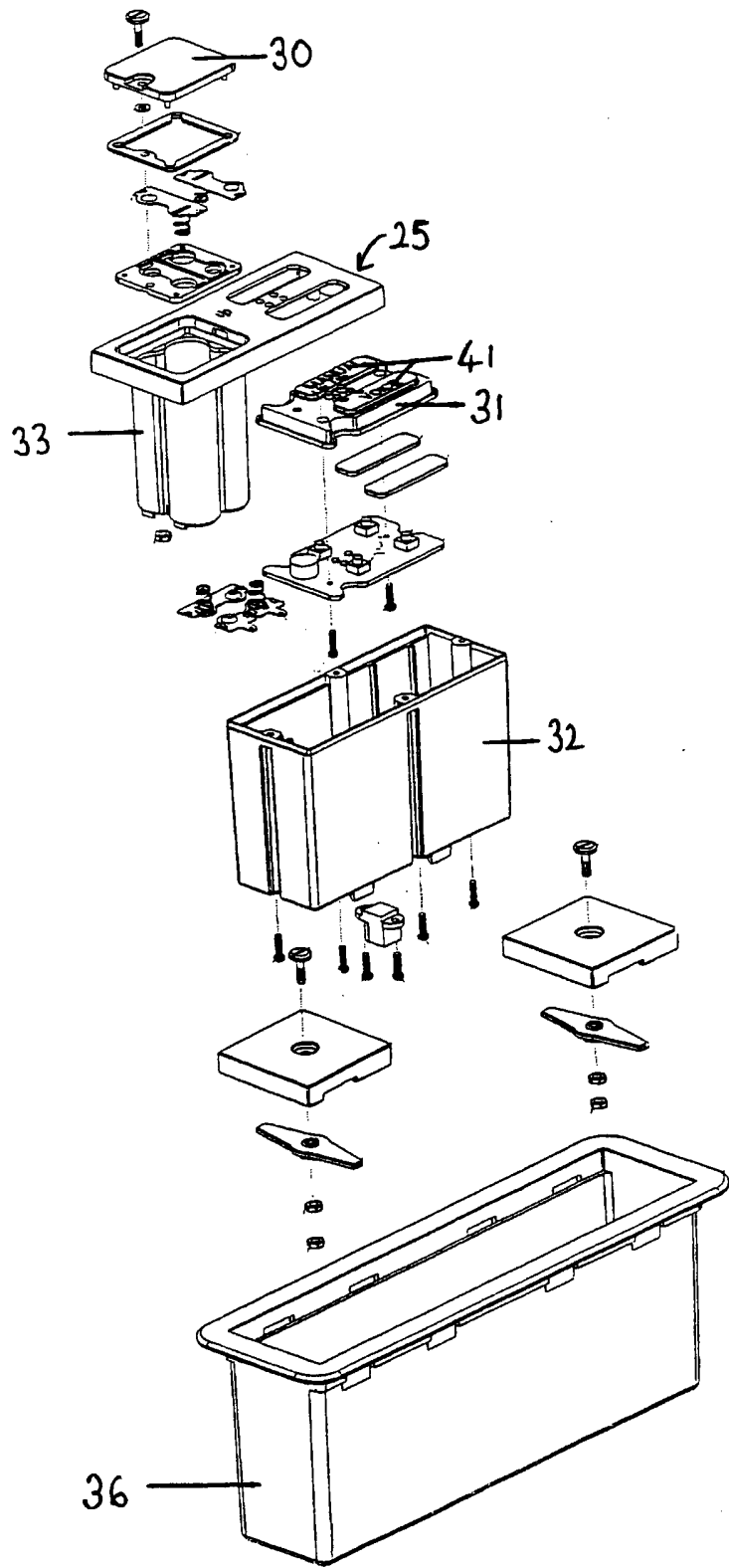


Figure 2

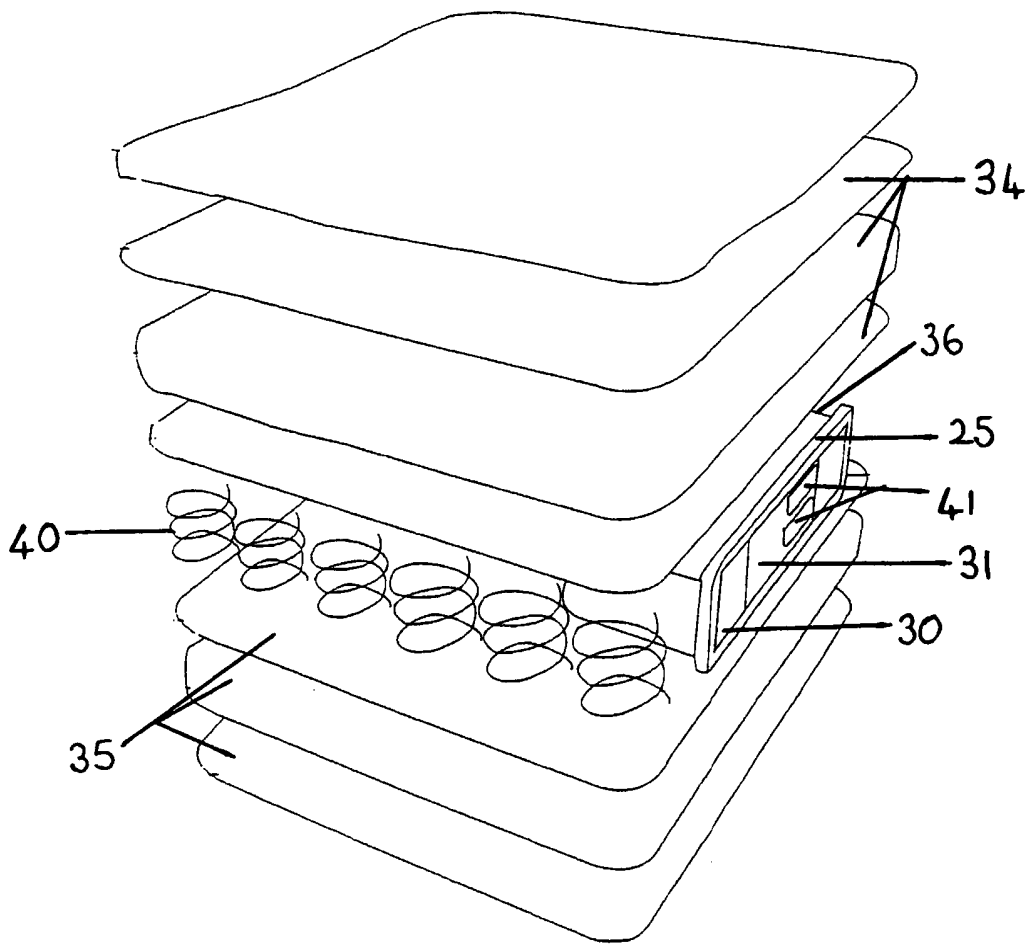


Figure 3



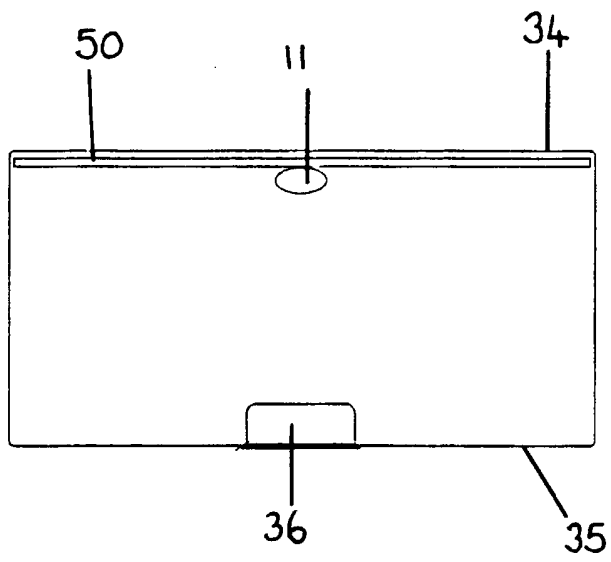
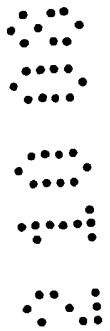


Figure 4



Improvements in or relating to mattresses

The present invention relates to improvements in or relating to mattresses, in particular to a vibrating mattress for use by a child, particularly in a cot, and which
5 encourages the child to fall asleep and remain asleep.

Mattresses with means for generating vibration have been used for some time in order to aid relaxation and sleep in children and adults alike. A traditional mattress has an internal support structure, such as springs and interconnecting members. In a typical
10 vibrating mattress, a vibrating device is secured to this internal structure enabling waves of vibration to be transmitted throughout the mattress. These waves of vibration can be felt when touching the surface of the mattress.

Vibration is conveniently achieved by means of one or more motors. Improvements
15 made in the field in recent years have enabled mattress vibration to be controlled more precisely. For example, US 6,785,922 discloses a mattress with an internal vibrating device wherein vibration slows to a gradual stop after use to prevent disturbing the user. The vibrating mattress of US 6,785,922 further comprises a control unit within an outer wall of the mattress for controlling the duration/intensity of vibration.

20 Further variations of vibrating mattresses have been proposed. For example, CA 2,098,068 proposes that vibration may be controlled remotely. The same document also suggests that vibration may be initiated in response to sound made by a user of the mattress. Sound activation has particular advantages for a child's mattress;
25 vibration can be initiated during the night if the child awakes, without the need for an adult to be present to operate manual controls.

There are, however, particular difficulties with the vibrating mattresses disclosed in the prior art, which the present invention seeks to address. Although sound-activated
30 vibration is advantageous for a child's mattress, it is problematic to determine a single suitable sound threshold, beyond which vibration should be initiated. Children of different ages and different personalities will create varying levels of sound on

awakening. The duration of sound that is considered acceptable during the night also varies from one individual parent/child to another. The present invention seeks to improve existing vibrating mattresses by allowing a user to select a threshold that is suitable for a particular child or a particular situation. Easily accessible manual
5 controls improve the usability of the mattress of the present invention.

With use of a sound-activated vibrating mattress, there are likely to be repeated episodes of vibration during a single night. Continuous vibration as a means for inducing sleep can, in some cases, become ineffective - or have decreasing effect -
10 with repeated use. The present invention seeks to address the problem of decreasing effect by introducing variable patterns of vibration. For example, irregular vibration can be used to seek to mimic the effects of a driven car or a pram pushed over an uneven surface, which are thought to encourage sleep in infants.

15 According to a first embodiment of the present invention there is provided a mattress unit comprising a mattress having an upper layer and a lower layer; a vibration unit mounted intermediate the upper layer and the lower layer of said mattress; a control unit having at least one manual control, such that said vibration unit is operable by means of said control unit; and a sound monitor such that in operation said sound
20 monitor detects sound made by a user of said mattress unit and in the event that detected sound exceeds a threshold level said sound monitor actuates said vibration unit, wherein said threshold level is adjustable by means of said manual control.

Preferably, the vibration unit comprises at least two motors. Advantageously, the
25 motors are oriented co-axially. Suitably, in operation, a first motor is generally out of phase with a second motor. Ideally, in operation of the mattress unit, the vibration unit generates an irregular pattern of vibration within the mattress.

According to a second embodiment of the present invention, there is provided a
30 mattress unit comprising a mattress having an upper layer and a lower layer; a vibration unit having at least two motors mounted intermediate the upper layer and the lower layer of said mattress, the motors being oriented co-axially or with parallel,

perpendicular or oblique axes; a control unit having at least one manual control, such that said vibration unit is operable by means of said control unit; wherein an irregular pattern of vibration is generatable within said mattress by means of said vibration unit.

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Preferably, the mattress unit further comprises a sound monitor, such that in operation said sound monitor detects sound made by a user of said mattress unit and, in the event that detected sound exceeds a threshold level, said sound monitor actuates said vibration unit.

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Advantageously, the threshold level at which vibration is activated is adjustable. Suitably, the threshold level is adjustable by means of a manual control located on the control unit. In a preferred embodiment, the sound monitor is located on the control unit. Alternatively, the sound monitor is located on the mattress. Preferably, on activation of the vibration unit, vibration subsists for a period of 1 to 10 minutes. More preferably, vibration subsists for 2 to 5 minutes. Suitably, the sound monitor will actuate the vibration unit a maximum of 2 to 10 times during a 12 hour period. Preferably, the vibration unit is activated between 6 and 8 times.

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Advantageously, the vibration unit of the present invention is actuated by the sound monitor in the event that the amplitude, duration or pitch of detected sound reaches a threshold level. More advantageously, the vibration unit is actuated by the sound monitor in the event that the combination of the amplitude and pitch of detected sound accumulated over a period of 30 seconds to 15 minutes reaches a threshold level.

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Suitably, the threshold level is adjustable by means of a manual control located on the control unit. Ideally, the threshold level is variable between at least high sensitivity and low sensitivity. Preferably, at high sensitivity the threshold is lower than the threshold at low sensitivity. Suitably, at high sensitivity the vibration unit is actuated in the event that the amplitude of detected sound accumulated over a period of 2 to 5 minutes exceeds the threshold level. Suitably, at low sensitivity the vibration unit is actuated in the event that the amplitude of detected sound accumulated over a period of 5 to 10 minutes exceeds a threshold level.

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It is advantageous that the vibration unit is mounted at the foot end of a mattress. Preferably, the vibration unit is coupled to an elongate member within the mattress. Typically, the elongate member is positioned along a side of the mattress. Optionally,
5 the control unit is mounted at an outer edge of the mattress. Alternatively, the control unit is remote from the mattress. Preferably, the orientation of one or more manual controls on the control unit is variable with respect to the control unit. Suitably, the manual controls are located on one or more control panels. In one embodiment, the control panels are moveable with respect to the control unit by means of runners.

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Suitably, the mattress unit of either embodiment of the present invention further comprises a voice recorder unit capable of recording a verbal message. Additionally, the mattress unit may comprise a speaker unit. Preferably, the mattress unit further comprises a thermometer and/or humidity detector.

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A specific embodiment of the invention will now be described by way of example only and with reference to the accompanying drawings in which:

Figure 1 is an expanded view and a perspective view of an embodiment of a vibration
20 unit in accordance with the present invention;

Figure 2 is an expanded view of an embodiment of a control unit in accordance with the present invention;

Figure 3 is an expanded view of an embodiment of a mattress unit having a control unit of the embodiment of Figure 2; and

25 Figure 4 is a cross-sectional view of an embodiment of a mattress unit in accordance with the present invention.

With reference to Figure 1 there is shown a vibration unit having a motor assembly suitable for generating waves of vibration within a mattress in accordance with the
30 present invention, typically a mattress used in a cot. The motor assembly comprises a lower housing 10 and an upper housing 11 - which are combinable with a central housing 24 to form a motor housing - and two motor units 12, 13, housed therein.

Motor units 12, 13 have parallel axes and are held in place by the walls of lower housing 10 and by central housing 24. Central housing 24 comprises two retaining rings which can be slotted within its outer shell. In the assembled vibration unit, the retaining rings receive motor units 12, 13. Central housing 24 is configured to connect the lower edge of upper housing 11 to the upper edge of lower housing 10.

Prior to use of the motor assembly, upper housing 11 can be reversibly coupled to lower housing 10 via central housing 24, with motors 12, 13 retained therein. Screws 14 secure upper housing 11 to central housing 24. Central housing 24 is secured to lower housing 10 by means of protrusions located on an outer side of housing 24 which engage, in the assembled vibration unit, with complementary protrusions located on an outer side of housing 10. The reversible coupling of upper housing 11 and lower housing 10 allows for easy access to motor units 12, 13 after assembly, for the purposes of maintenance, for example.

With reference to Figure 2 there is illustrated an embodiment of a control unit suitable for controlling the operation of the vibration unit of Figure 1. The control unit has main control panel 25, peripheral control panels 30, 31, control sleeve 32, battery compartment 33 and control casing 36.

Main control panel 25 is rectangular in shape and comprises the electronic circuitry which enables operation of the vibration unit of Figure 1. Battery compartment 33 protrudes from the reverse of main control panel 25 and is configured to house batteries as required. Main control panel 25 is securable to control sleeve 32; battery compartment 33 is thereby housed within control sleeve 32. Control sleeve 32, together with control panels 25, 30, 31, is retainable by control casing 36. Peripheral control panel 31 comprises two manually depressible buttons 41 for operation of the control unit. Buttons 41 run the width of control panel 31 and in use they are easily accessible through the bars of a cot. . Control casing 36 can be positioned within a mattress having the vibration unit of Figure 1.

With reference to Figure 3 there is illustrated the construction of a traditional mattress which is suitable for use in the mattress unit of the present invention. The mattress comprises upper layers 34, lower layers 35 and an internal spring structure 40. The vibration unit of Figure 1 is securable within the mattress by coupling to a slat positioned at one edge of the mattress.

The control unit shown in Figure 2 is mountable at an edge of the mattress of Figure 3. In the mattress of Figure 3, a part of internal spring structure 40 has been removed to provide space for control casing 36, which is securable between upper layers 34 and lower layers 35. Buttons 41 are accessible from the exterior of the mattress for activation and operation of the control unit. In a complete mattress unit in accordance with the present invention, the uppermost layer of upper layers 34 and the lowermost layer of lower layers 35 extend to cover the four edges of the mattress, with only control panels 25, 30, 31 remaining visible to the user.

With reference to Figure 4 there is illustrated a cross sectional view of a mattress unit comprising a mattress with upper layers 34, lower layers 35, a control unit, and a vibration unit. The vibration unit is coupled to an elongate slat 50 which extends along the top edge of the mattress. In use, waves of vibration generated by the vibration unit are propagated via slat 50 from layers 34 to layers 35 of the mattress.

As described above, preferably the vibration unit generates an irregular pattern of vibration within the mattress. This is achieved by means of mounting the two motors with their axes of rotation co-axial or parallel so that interference patterns develop between the motors. This can be enhanced by providing that the two motors are of different models. However, it has been found that notionally identical motors typically have slightly different behaviours such that they do not rotate at exactly the same speed and good interference patterns are generated leading to irregular vibration of the unit.

CLAIMS:

1. A mattress unit comprising:
 - a mattress having an upper layer and a lower layer;
 - 5 a vibration unit mounted intermediate the upper layer and the lower layer of said mattress;
 - a control unit having at least one manual control, such that said vibration unit is operable by means of said control unit; and
 - a sound monitor such that in operation said sound monitor detects sound made by
 - 10 a user of said mattress unit and in the event that detected sound exceeds a threshold level said sound monitor actuates said vibration unit, wherein said threshold level is adjustable by means of said at least one manual control.

2. A mattress unit as claimed in Claim 1 wherein said vibration unit comprises at
- 15 least two motors.

3. A mattress unit as claimed in Claim 1 or Claim 2 wherein said motors are mounted within the vibration unit with their axes of rotation co-axial or parallel.

- 20 4. A mattress unit as claimed in any one of claims 1 to 3 wherein in operation a first motor is out of phase with a second motor.

5. A mattress unit as claimed in any one of the preceding claims wherein in operation of the mattress unit said vibration unit generates an irregular pattern of
- 25 vibration within said mattress.

6. A mattress unit comprising
 - a mattress having an upper layer and a lower layer;
 - a vibration unit having at least two motor units mounted intermediate the
 - 30 upper layer and the lower layer of said mattress, the motors being co-axial;

a control unit having at least one manual control, such that said vibration unit is operable by means of said control unit, wherein an irregular pattern of vibration is generatable within said mattress by means of said vibration unit.

- 5 7. A mattress unit as claimed in Claim 6 further comprising a sound monitor such that in operation said sound monitor detects sound made by a user of said mattress unit and in the event that detected sound exceeds a threshold level said sound monitor actuates said vibration unit,
- 10 8. A mattress unit as claimed in Claim 6 or Claim 7 wherein said threshold level at which vibration is activated is adjustable.
9. A mattress unit as claimed in Claim 8 wherein said threshold level is adjustable by means of a manual control located on said control unit.
- 15 10. A mattress unit as claimed in any one of the preceding claims wherein said sound monitor is located on said control unit.
11. A mattress unit as claimed in any one of the preceding claims wherein said
20 sound monitor is located on said mattress.
12. A mattress unit as claimed in any one of the preceding claims wherein upon activation of said vibration unit, vibration subsists for a period of 30 seconds to 10 minutes.
- 25 13. A mattress unit as claimed in any one of the preceding claims wherein upon activation of said vibration unit, vibration subsists for 2 to 5 minutes.
14. A mattress unit as claimed in any one of the preceding claims wherein said
30 sound monitor actuates said vibration unit a maximum of 2 to 10 times during a 12-hour period and preferably 6-8 times.

15. A mattress unit as claimed in any one of the preceding claims wherein said vibration unit is actuated by the sound monitor in the event that the amplitude of detected sound reaches a threshold level.
- 5 16. A mattress unit as claimed in any one of the preceding claims wherein said vibration unit is actuated by the sound monitor in the event that the amplitude of sound accumulated over a period of 1 to 15 minutes reaches a threshold level.
17. A mattress unit as claimed in any one of the preceding claims wherein said
10 threshold level is variable between at least high sensitivity and low sensitivity.
18. A mattress unit as claimed in any one of the preceding claims wherein at high sensitivity the threshold is lower than the threshold at low sensitivity.
- 15 19. A mattress unit as claimed in any one of the preceding claims wherein at high sensitivity said vibration unit is actuated in the event that the amplitude of detected sound accumulated over a period of 2 to 5 minutes exceeds a threshold level.
20. A mattress unit as claimed in any one of the preceding claims wherein at low
20 sensitivity the vibration unit is actuated in the event that the amplitude of detected sound accumulated over a period of 5 to 10 minutes exceeds a threshold level.
21. A mattress unit as claimed in any one of the preceding claims wherein said
25 sound monitor will actuate said vibration unit a maximum of 2 to 10 times during a 12 hour period and preferably 6 to 8 times.
22. A mattress unit as claimed in any one of the preceding claims wherein said vibration unit is coupled to an elongate element within the mattress.
- 30 23. A mattress unit as claimed in claim 22 wherein the elongate element is positioned along a side of the mattress.

24. A mattress unit as claimed in any one of the preceding claims wherein said control unit is mounted at an outer edge of said mattress.

5 25. A mattress unit as claimed in any one of the preceding claims wherein said control unit is remote from said mattress.

26. A mattress unit as claimed in any one of the preceding claims further comprising a voice recorder unit capable of recording a verbal message.

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27. A mattress unit as claimed in any one of the preceding claims wherein said mattress unit comprises a speaker unit.

15 28. A mattress unit as claimed in any one of the preceding claims further comprising a thermometer and/or humidity detector.

29. A mattress unit substantially as herein described with reference to the accompanying figures.

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Examiner: Mrs Birgitte Myrup
Examiner

Claims searched: 1-29

Date of search: 27 June 2008

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
A	-	US 6027463 A (MORIYASU) 22.02.2000, see abstract, claims, column 1, line 50-62 and column 3, line 27-49.
A	-	DE 3838351 A1 (LERCHL) 23.05.1990, see claims and column 2, line 31-53.
A	-	US 2917043 A (MURPHY) 15.12.1959, see figure and claim 19 and 21.

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; A61H

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

EPODOC, WPI, TXTE

International Classification:

Subclass	Subgroup	Valid From
A61H	0001/00	01/01/2006
A47D	0009/02	01/01/2006