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(71) Applicant: **Bekina NV**
9690 Kluisbergen (BE)

(72) Inventor: **Vanderbeke, Thomas**
9690 Kluisbergen (BE)

(74) Representative: **BiiP cvba**
Culliganlaan 1B
1831 Diegem (Bruxelles) (BE)

(54) ADJUSTABLE SLAT SUSPENSION DEVICE

(57) A suspension device for supporting a mattress comprising:
a base part (1) comprising slots (2) for attachment to a bedding structure;
a top part (3) comprising slots (4) for receiving slats therein;
a spring element provided between the base (1) and the top part (3) for resiliently suspending the slats in view of the bedding structure, whereby the spring element comprises at least:
• a first spring element (5) extending between the base part (1) and the top part (3) of the device; and
• a second spring element (6) extending between the base part (1) and the top part (3) of the device; and
• an adjustable member (7) allowing adapting the spring characteristic of the suspension device,
wherein said second spring element (6) comprises a first spring portion (6a) fixed to the base part (1) and extending towards the top part (3); a second spring portion (6b) fixed to the top part (3) and extending towards the base part (1); and a bridge portion (6c) connecting the free ends of the first and second spring portions (6a, 6b), whereby the first and second spring portions (6a, 6b) are spaced apart in a direction perpendicular to the suspension direction and the bridge portion (6c) defining an abutment surface (8) and in that the adjustable member (7) is movable in a guide (9) or series of slots provided in the top part (3) and comprises an actuating member (10) that is in contact with the abutment surface (8), such that repositioning the adjustable member (7) in said guide (9) or series of slots changes the contact position of the actuating member (10) on the abutment surface (8), thereby varying the spring characteristic of the device.

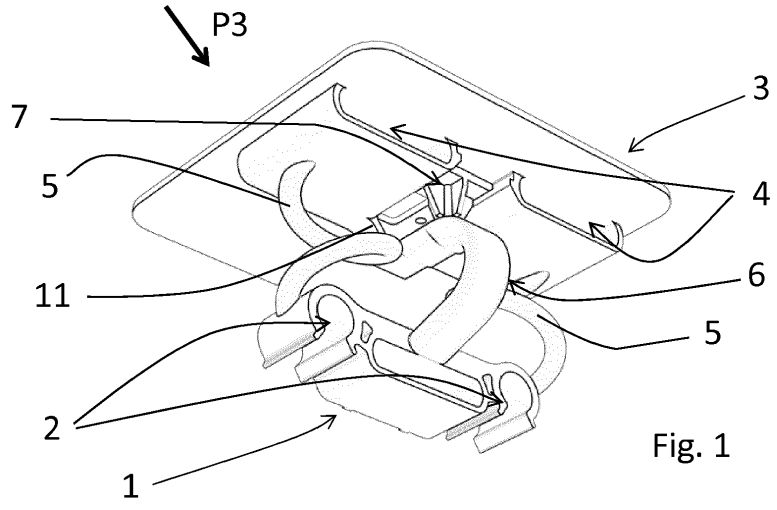

Fig. 1

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Description

Technical Field

[0001] The present invention concerns a suspension device for supporting slats of a bedding, in particular a suspension device with an adjustable spring characteristic.

Background for the Invention

[0002] Adjustable suspension devices for holding slats of a bedding are known from example given EP1649786 and US20130334746. In EP1649786 a suspension device is described comprising a base portion comprising slots for attachment to a bedding structure; a top portion for receiving slats therein; and a first spring element comprising two leaf springs extending from the base part to the top part. A second spring element is provided on the base part of the suspension device and extends towards, but not until the top part, whereby the second spring element is configured as a bridge structure on the base part of the device and defines an abutment surface facing the top part of the device. An adjustable member in the form of a notch is provided on the top part, whereby the notch protrudes from the top part in the direction of the abutment surface. In an non tensioned position, the notch is spaced away from the abutment surface but upon tensioning the device, the top part is pressed down, first only biased by the first spring element and upon contact with the abutment surface biased by both the first and second spring elements, thereby changing the spring characteristic. By turning the notch, the distance by which the top part can be pressed towards the base before increasing the biasing force can be varied.

[0003] A disadvantage of a suspension device according to EP1649786 is that the spring characteristic can only be varied by altering the distance over which the first spring elements are to be compressed before activation of the second spring element. As such no variation can be achieved from the first moment of compressing the spring, nor can the strength of the variation be altered. Another disadvantage of this suspension device is that when the notch impacts on the abutment surface, a noise is generated which is highly unwanted in the bedding industry.

[0004] The suspension device according to US20130334746 comprises a base portion comprising slots for attachment to a bedding structure; a top portion for receiving slats therein; and first and second spring elements comprising extending from the base part to the top part. The second spring element is provided fixed to the base part of the suspension device and comprises a free end that is movably mounted in a guide in the top part, such that upon movement of the free end of the second spring element in the guide, the shape of the second spring element is altered and the spring characteristic is altered.

[0005] Although the suspension device according to US20130334746 allows varying the spring characteristic from the first compression of the suspension device, it has the inconvenient that the free end of the second spring element tends to move in the slot during use, thereby altering the spring characteristic unintentionally. Another disadvantage is that when moving the free end to an extreme position as shown in figure 33C of US20130334746, results in the second spring element having a major portion extending perpendicularly in view of the base and top parts of the spring element, thereby limiting the distance over which the suspension device can be compressed.

[0006] From the above it is clear that there remains a market need for easy to use and user friendly suspension device allowing altering the spring characteristic over the entire course of the suspension device and without major impact on the maximum distance over which the suspension device can be compressed.

Summary of the Invention

[0007] The present invention meets the above market needs by providing a suspension device for supporting a mattress comprising:

a base part comprising slots for attachment to a bedding structure;
a top part comprising slots for receiving slats therein;
a spring element provided between the base and the top part for resiliently suspending the slats in view of the bedding structure, whereby the spring element comprises at least:

- a first spring element extending between the base part and the top part of the device; and
- a second spring element extending between the base part and the top part of the device; and
- an adjustable member allowing adapting the spring characteristic of the suspension device,

characterised in that said second spring element comprises a first spring portion fixed to the base part and extending towards the top part; a second spring portion fixed to the top part and extending towards the base part; and a bridge portion connecting the free ends of the first and second spring portions, whereby the first and second spring portions are spaced apart in a direction perpendicular to the suspension direction and the bridge portion defining an abutment surface
and in that the adjustable member is movable in a guide or series of slots provided in the top part and comprises an actuating member that is in contact with the abutment surface, such that repositioning the adjustable member in said guide or series of slots changes the contact position of the actuating member on the abutment surface, thereby varying the spring characteristic of the device.

[0008] The second spring element is preferably fas-

tened to the base part and to the top part of the device preventing release of the second spring element without use of tools or destroying the suspension device.

[0009] The first spring element preferably comprises a coil spring and more preferably two coil springs whereby the second spring element is positioned between the first and second coil springs of the first spring element.

[0010] It is preferred that the base part, first spring element and top part are manufactured in a single piece and even more preferred that the base part, first spring element, second spring element and top part are manufactured in a single piece.

[0011] The first spring element may be manufactured in a first material while the second spring element is manufactured in a second material different than the first material.

[0012] According to a preferred embodiment the abutment surface extends in a plane parallel to the plane wherein the series of slots or guide extends, whereby the distance D between the top part and the contacting point of the actuating member on the abutment surface is constant for several positions of the actuating member in the device.

Brief Description of the Figures

[0013]

Figure 1 shows perspective view of a suspension device according to the invention

Figure 2 shows a cross sectional view of the suspension device in Fig. 1 ;

Figure 3 shows a perspective view according to arrow P3 in Fig. 1;

Figures 4a, b & c show a partial side view of the suspension device in Fig. 1.

Detailed Description of a Preferred Embodiment

[0014] Figure 1 shows a suspension device according to the present invention comprising a base part 1 comprising slots 2 for attachment to a bedding structure;
a top part 3 comprising slots 4 for receiving slats therein;
a spring element provided between the base 1 and the top part 3 for resiliently suspending the slats in view of the bedding structure, whereby the spring element comprises at least:
a first spring element 5 extending between the base part 1 and the top part 3 of the device; and
a second spring element 6 extending between the base part 1 and the top part 3 of the device; and
an adjustable member 7 allowing adapting the spring characteristic of the suspension device.

[0015] According to the invention and as shown in more detail in Figure 2, the second spring element 6 comprises a first spring portion 6a fixed to the base part 1 and extending towards the top part 3; a second spring portion 6b fixed to the top part 3 and extending towards the base part 1 and a bridge portion 6c connecting the free ends of the first and second spring portions, whereby the first and second spring portions 6a&b are spaced apart in a direction Y perpendicular to the suspension direction Z. The bridge portion 6c defines an abutment surface 8.

[0016] The adjustable member 7 extends through the top part 3 and is movable in a guide 9 or series of slots provided in the top part 3 and comprises an actuating member 10 that is in contact with the abutment surface, such that repositioning the adjustable member 7 in said guide 9 or series of slots changes the contact position of the actuating member 7 on the abutment surface 8, thereby varying the spring characteristic of the device.

[0017] In the represented embodiment, the first spring portion 6a consists of a U-shaped resilient element extending -in a non tensioned state, ie when no load is applied on the device - from the base part 1 of the device on a level Z_0 upto a level Z_1, where the first spring portion 6a extends into the bridge portion 6c. The first spring portion is hereby oriented such that the U-shape extends in the Z-Y plane and the bridge portion extends one of the legs of the U-shape in that Z-Y plane. The second spring element 6b comprises two wing-like structures 11 extending from the level Z_1 to a level Z_2 where it is connected to the top part 3 of the device. The distance from Z_0 to Z_1 is smaller than the distance from Z_0 to Z_2 such that a void is defined between the free end of the first spring portion 6a that is connected to the bridge portion 6c of the second spring element and the top part 3 of the device. The bridge portion 6c defines the abutment surface 8 that in this case faces the top part 3 of the device and extends on a level Z_x in between the levels Z_0 and Z_2.

[0018] As illustrated in figure 3, the guide 9 or series of slots provided in the top part 3 of the device extend along the Y direction and hence make it possible to vary the position of the adjustable member and in particular the actuating member 10 in the Y direction. The adjustable member 7 extends in the Z direction through the guide or slot from the level Z_2 to the level Z_x where it contacts the abutment surface 8 of the bridge portion 6c. Alternatively, the abutment surface can be defined on a surface of the bridge portion 6c facing the base part 1 of the device, in which case the actuating member 10 comprises a shaped part for contacting the abutment surface 8.

[0019] The first spring element 5 in this case comprises two coil springs both extending from the base part 1 to the top part 3 of the device, although the type of spring to be used is not limited to coil springs but can be of any desired type such as leaf springs, bulge springs or such.

[0020] The two springs of the first spring element 5 are preferably spaced apart in the X-direction and are position at opposed sides of the second spring element 6.

[0021] The device is preferably manufactured in a polymeric material selected from the group comprising: polyolefin, in particular polypropylene or polyethylene; polyester; block-copolymers such as ABS and or admixtures

thereof. Preferably the device is manufactured in one single piece, although in order to have more options in varying the spring characteristic of the device the first and second spring elements can be manufactured in different materials.

[0022] Irrespective of the material choice of the device, it is preferred that the second spring element is fixed to or unified with the remainder of the device such that it can not be removed or separated therefrom without the use of tools or destroying the device, the second spring element is not intended to be a easily removable part for altering the spring characteristic.

[0023] The functioning of the suspension device according to the invention is easy and as follows.

[0024] In assembled state, irrespective of the tension applied on the suspension device, the actuating member 10 contacts the abutment surface, and any compression of the suspension device due to an increase of load will be biased by the compression force of both the first and second spring elements 5&6. As illustrated in figure 4a-c, depending on the position of the actuating member on the bridge portion 6c of the second spring element 6, the spring characteristic or compression force of the suspension device can be altered.

[0025] Indeed, upon changing the contact position of the actuating member 10 on the abutment surface 8 closer or further away from the U-shape of the first spring portion 6a of the second spring element 6, the resistance of the second spring element to compression is altered and as such the overall spring characteristic of the suspension is altered. As illustrated in figures 2 and 3, changing of the contact position of the actuating member 10 is most conveniently done by moving a grip 12 of the adjustable member 7 protruding through the guide 9 or series of slots from the top part 3 of the device.

Claims

1. A suspension device for supporting a mattress comprising:

   a base part comprising slots for attachment to a bedding structure;
   a top part comprising slots for receiving slats therein;
   a spring element provided between the base and the top part for resiliently suspending the slats in view of the bedding structure, whereby the spring element comprises at least:

   • a first spring element extending between the base part and the top part of the device; and
   • a second spring element extending between the base part and the top part of the device; and
   • an adjustable member allowing adapting the spring characteristic of the suspension device,
   characterised in that said second spring element comprises a first spring portion fixed to the base part and extending towards the top part; a second spring portion fixed to the top part and extending towards the base part; and

   a bridge portion connecting the free ends of the first and second spring portions, whereby the first and second spring portions are spaced apart in a direction perpendicular to the suspension direction and the bridge portion defining an abutment surface
   and **in that** the adjustable member is movable in a guide or series of slots provided in the top part and comprises an actuating member that is in contact with the abutment surface, such that repositioning the adjustable member in said guide or series of slots changes the contact position of the actuating member on the abutment surface, thereby varying the spring characteristic of the device.

2. The suspension device according to claim 1, wherein in a non tensioned state of the suspension device a void is defined between the first spring portion of the second spring element and the top part of the device and wherein a void is defined between the second spring portion and the base part of the suspension device.

3. The suspension device according to claims 1 or 2, wherein the second spring element is fastened to the base part and/or to the top part of the device preventing release of the second spring element without use of tools or destroying the suspension device.

4. The suspension device according to any of the preceding claims, wherein the first spring element comprises a coil spring.

5. The suspension device according to any of the preceding claims, wherein the first spring element comprises two coil springs and wherein the second spring element is positioned between the first and second coil springs of the first spring element.

6. The suspension device according to any of the preceding claims, wherein the base part, first spring element and top part are manufactured in a single piece.

7. The suspension device according to claim 5, wherein the base part, first spring element, second spring element and top part are manufactured in a single

piece.

8. The suspension device according to any of the preceding claims, wherein the first spring element is manufactured in a first material and the second spring element is manufactured in a second material different than the first material.

9. The suspension device according to any of the preceding claims, wherein the abutment surface substantially extends in a plane parallel to the plane wherein the series of slots or guide extends.

10. The suspension device according to any of the preceding claims, wherein the distance D between the top part and the contacting point of the actuating member on the abutment surface is constant for several positions of the actuating member in the device.

11. The suspension device according to any of the preceding claims, wherein the abutment surface 8 faces the top part 3 of the suspension device.

12. The suspension device according to any of the preceding claims, wherein the abutment surface 8 faces the bottom part 3 of the suspension device and wherein the actuating member comprises a hook shaped part for contacting the abutment surface.

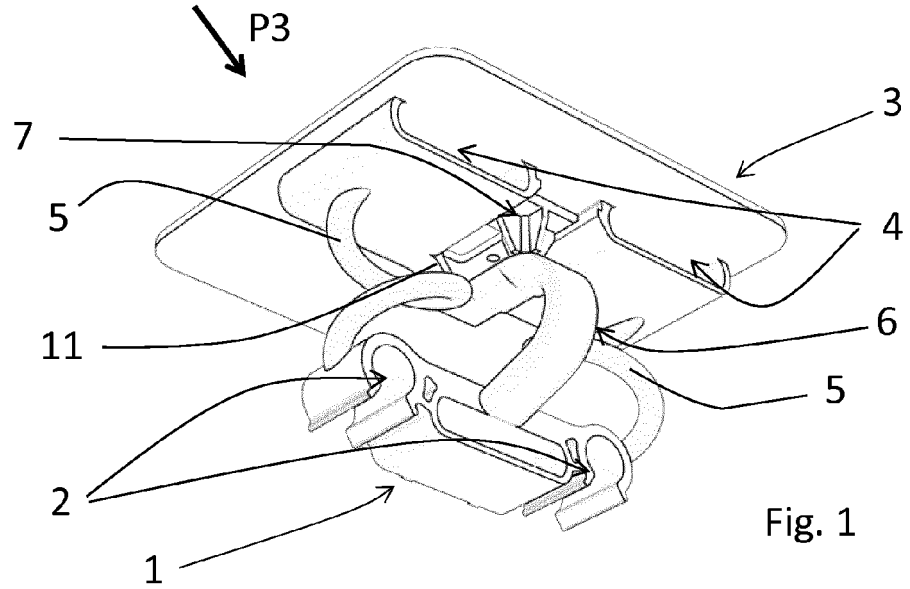

Fig. 1

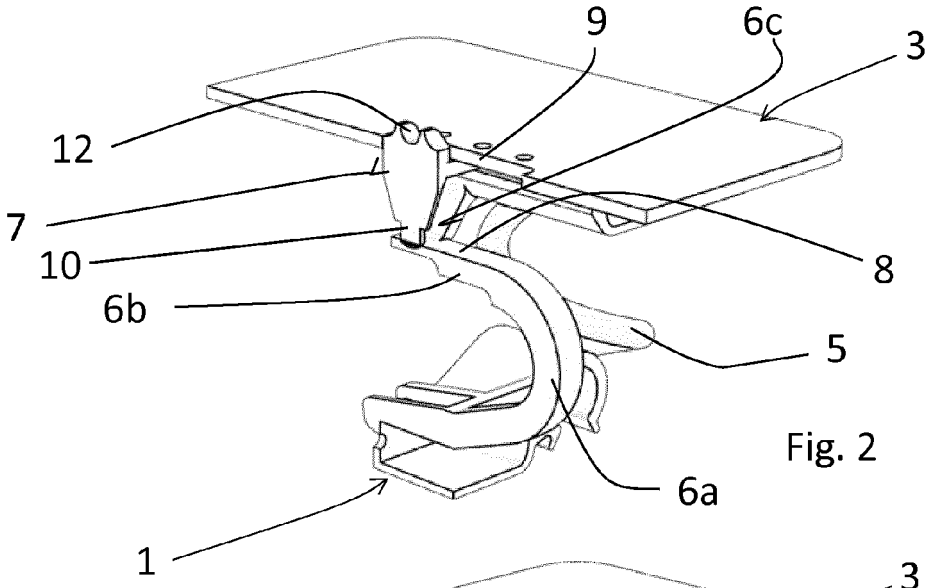

Fig. 2

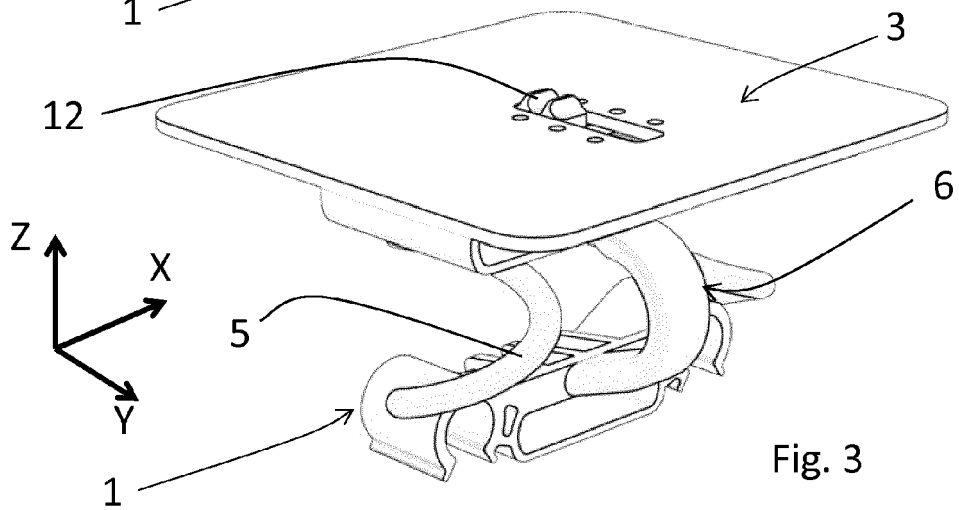

Fig. 3

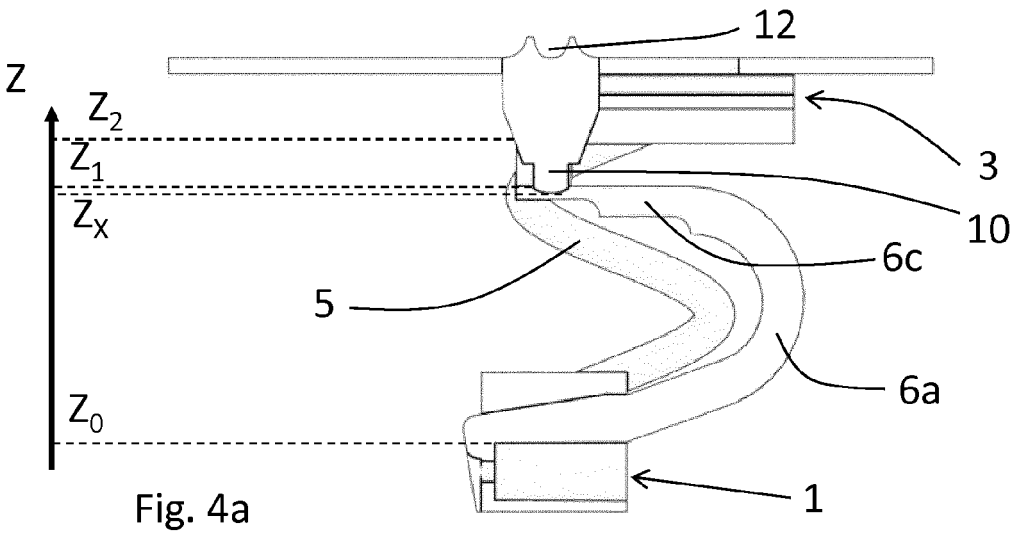

Fig. 4a

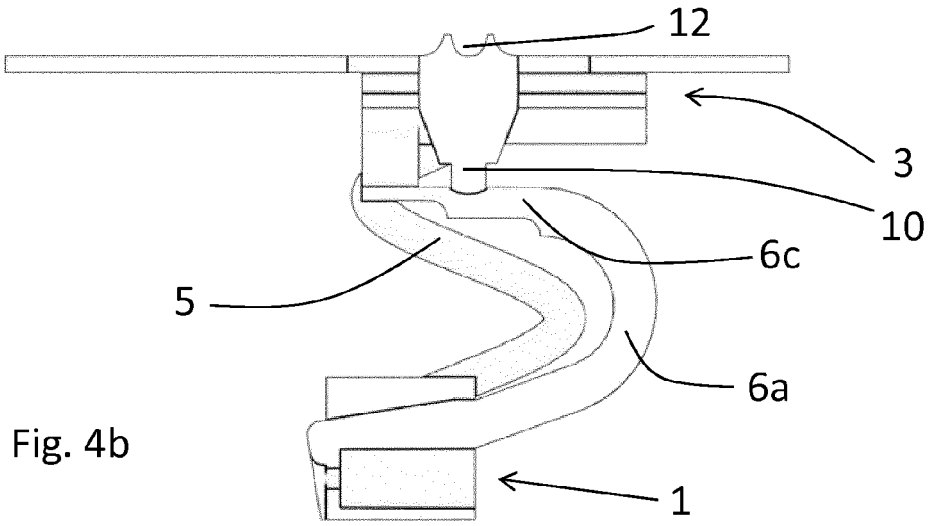

Fig. 4b

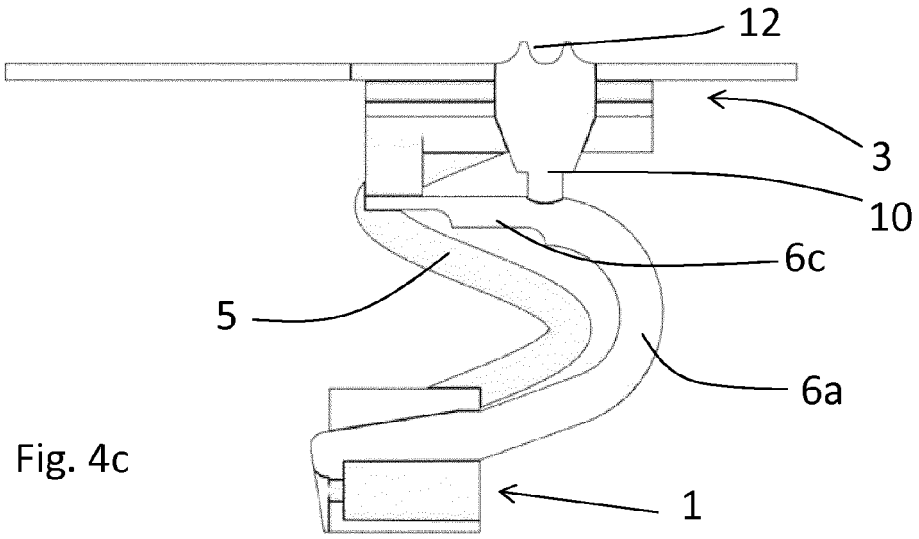

Fig. 4c

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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 5564

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 364 600 A1 (DELAHOUSSE ET FILS SA) 26 November 2003 (2003-11-26) * paragraphs [0066], [0067]; claims; figures 6,18,19 *	1-3,6, 9-11	INV. A47C23/06
A	EP 1 836 934 A1 (DELAHOUSSE ET FILS SA) 26 September 2007 (2007-09-26) * figure 1 *	1-12	
A,D	US 2013/334746 A1 (LOBRY ET AL) 19 December 2013 (2013-12-19) * figures *	1-12	

TECHNICAL FIELDS SEARCHED (IPC)

A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 September 2015	Kis, Pál

CATEGORY OF CITED DOCUMENTS

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08-09-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- US 20130334746 A **[0002] [0004] [0005]**