(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 865 011 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.08.2021 Bulletin 2021/33

(51) Int Cl.:
A47C 23/06 *(2006.01)*

(21) Application number: **21157639.2**

(22) Date of filing: **17.02.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **17.02.2020 BE 202005098**

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(54) DEVICE FOR ADJUSTING THE STIFFNESS OF A SPRUNG SLAT

(57) The invention relates to a device for adjusting the stiffness of a sprung slat, a slatted structure comprising the device and a slatted base comprising the device and/or the slatted structure. Preferred embodiments are described in claims 1 to 12 and 14 as well as throughout the description.

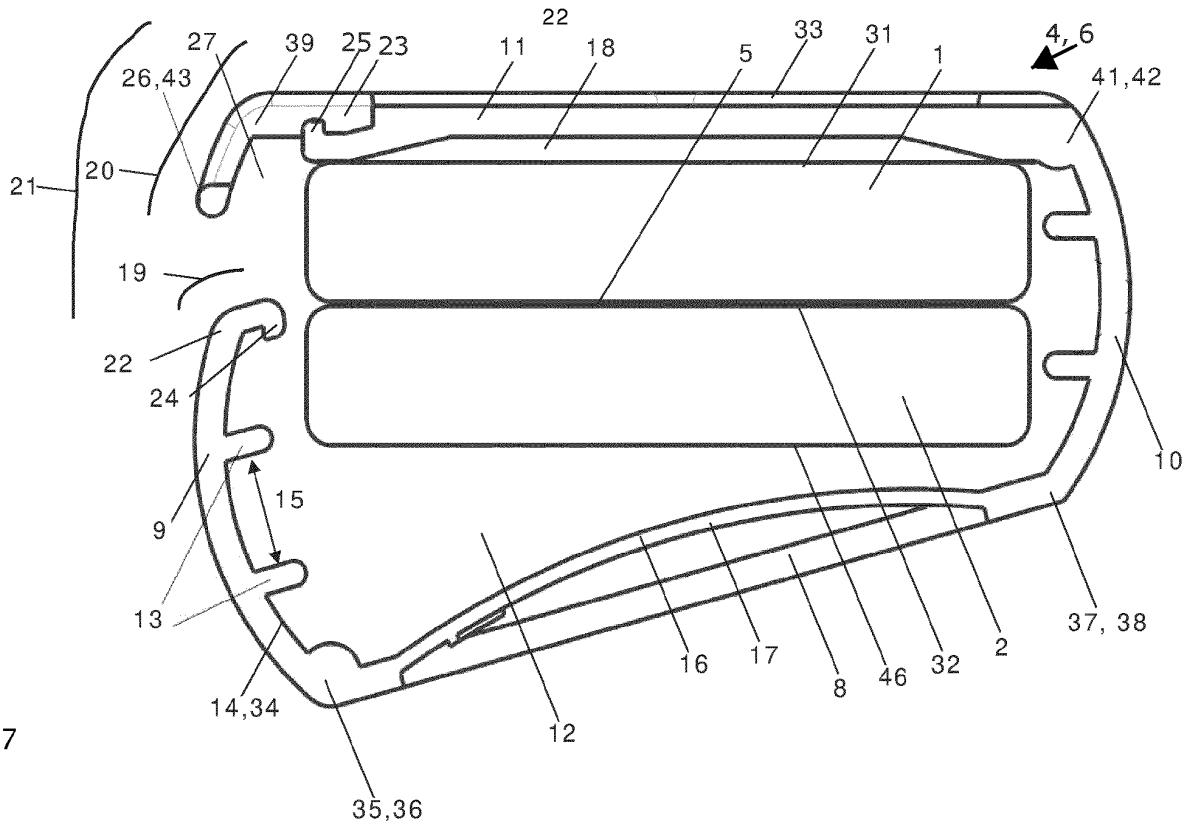

Fig. 7

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Description

TECHNICAL FIELD

[0001] The invention relates to a device for adjusting the stiffness of a sprung slat, a slatted structure comprising the device as well as a slatted base comprising the device and/or the slatted structure.

PRI OR ART

[0002] Devices for adjusting the stiffness of a slatted base are known in the art. Traditionally, such devices provide a bracket that is mounted in the slatted base.

[0003] EP3 143 905 describes an arrangement with three sprung slats, i.e. two adjacent upper sprung slats and a lower slat arranged underneath. The stiffness of the upper slats is adjusted by connecting the two upper sprung slats with a bracket. The bracket rests on the lower slat.

[0004] Further relevant documents in this regard are DE 93 07 324, EP 1 584 269, DE 297 11 870, DE 94 09 812, DE 20 2012 104296, FR 2 621 469 and IT TV20 090 129.

[0005] The applicant notes that such an arrangement is not easy to install. In addition, installation of the described device is not possible in every slatted base.

[0006] The present invention aims to find a solution for at least some of the above problems.

SUMMARY OF THE INVENTION

[0007] In a first aspect, the invention relates to a device for adjusting the stiffness of a sprung slat according to claim 1.

[0008] In a second aspect, the invention relates to a slatted structure according to claim 13.

[0009] In a third aspect, the invention relates to a slatted base according to claim 15. Preferred embodiments are described in claims 1 to 12 and 14 as well as throughout the description.

[0010] The present invention is extremely advantageous for adjusting the stiffness of a sprung slat, without this sprung slat having to be disassembled or replaced.

[0011] Moreover, the present invention is easier to install than systems as well as devices known in the art.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Figures 1 and 2 show a slatted base in a frame of a sofa bed.

Figures 3 to 6 show an attachment of a sprung slat support to a sprung slat.

Figures 7 to 12 show a detail of a sprung slat support attachment.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The invention relates to a device for adjusting the stiffness of a sprung slat, a slatted structure comprising the device and a slatted base comprising the device and/or the slatted structure. The invention was summarised in the section provided for this purpose. In the following, the invention is described in detail and preferred embodiments are explained in more detail.

[0014] Unless otherwise defined, all terms used in the description of the invention, including technical and scientific terms, have the meaning as commonly understood by a person skilled in the art to which the invention pertains. For a better understanding of the description of the invention, the following terms are explained explicitly.

[0015] In this document, 'a' and 'the' refer to both the singular and the plural, unless the context presupposes otherwise. For example, 'a segment' means one or more segments.

[0016] The terms 'comprise', 'comprising', 'consist of', 'consisting of', 'provided with', 'have', 'having', 'include', 'including', 'contain', 'containing' are synonyms and are inclusive or open terms that indicate the presence of what follows, and which do not exclude or prevent the presence of other components, characteristics, elements, members, steps, as known from or disclosed in the prior art.

[0017] 'Longitudinal' or 'longitudinal axis', as used herein for the present invention, is to be understood as a term known in the art that indicates a direction that is vertical when the device, i.e. the retaining bracket, of the present invention is placed on a horizontal surface is placed. Substantially, this direction indicates the height of the device. The longitudinal direction can also be referred to as the 'Y direction'.

[0018] 'Sagittal' or 'depth axis', as used herein for the present device, is to be understood as a term known in the art that indicates a horizontal direction when the device, i.e. the retaining bracket, according to the present invention is placed on a horizontal surface. Substantially, this direction indicates the direction perpendicular to the longitudinal direction and parallel to a direction of the bracket retaining region. The sagittal direction can also be referred to as the 'Z direction'.

[0019] 'Transverse' or 'width axis', as used herein for the present device, is to be understood as a term known in the art that indicates a horizontal direction when the device, i.e. the retaining bracket, according to the present invention is placed on a horizontal surface. Substantially, this direction denotes the direction perpendicular to the longitudinal direction and perpendicular to the sagittal direction. The transverse direction can also be referred to as the 'X direction'.

[0020] 'Frontal plane' as used herein for the present device, is to be understood as a term known in the art that indicates a vertical plane when the device, i.e. the

retaining bracket, according to the present invention is placed on a horizontal surface. Substantially, the frontal plane comprises both a longitudinal axis and a width axis. 'Central frontal plane,' as used herein, is to be understood as a term known in the art that indicates a frontal plane that bisects a body.

[0021] In a first aspect, the invention relates to a device for adjusting the stiffness of a sprung slat. Preferably, said sprung slat is mounted in a slatted base. The device at least comprises a retaining bracket for attaching an object to, preferably, an underside of said sprung slat. Preferably the object is a sprung slat support. Preferably, said retaining bracket comprises a bottom portion, a first and second side wall portion, and an upper portion. Preferably, said bottom portion has a first end connected to a first end of said first side wall portion. Preferably, said bottom portion has a second end connected to a first end of said second side wall portion. Preferably, said upper portion has a first end connected to a second end of said first side wall portion. Preferably, said upper portion has a second end connected to a second end of said second side wall portion. Preferably, said retaining bracket is adjustable between an open position and a closed position by pivoting at least a part of said retaining bracket. Preferably, a bracket retaining region is enclosed by said bottom portion, said first and second side wall portions and said upper portion when said retaining bracket is in the closed position. Preferably, said bracket retaining region opens along an outer circumference when said retaining bracket is adjusted to the open position.

[0022] In a second aspect, the invention relates to a slatted structure comprising a sprung slat, an object and a device according to a first aspect of the present invention for adjusting the stiffness of said sprung slat. Preferably, said object is a sprung slat support. Preferably, said device comprises a retaining bracket. Preferably, said object is connected to an underside of said sprung slat.

[0023] In a third aspect, the invention relates to a slatted base comprising a sprung slat connected to an object and a device according to a first aspect of the present invention. Preferably, said object is a sprung slat support. In a third aspect, the invention further also relates to a slatted base comprising a slatted structure according to a second aspect of the present invention.

[0024] A person of ordinary skill in the art will appreciate that a device according to a first aspect of the invention can be used in the slatted structure according to a second aspect and/or the slatted base according to a third aspect. In the following, the above aspects of the present invention are therefore discussed together. In addition, each feature described above and below may relate to any of the above aspects, even if the feature is described in conjunction with a specific aspect.

[0025] The object of the present invention is to provide a device for adjusting the stiffness of a sprung slat. In particular, the object of the present invention is to provide a device for the non-therapeutic treatment of a subject's back pain and in particular chronic back pain of the subject. More in particular, the object of the present invention is to provide a device for the non-therapeutic treatment of low back pain caused by hernia, bulging or degenerative discs, facet syndrome, failed back surgery or other physiological conditions of the spine. More in particular, the object of the present invention is to prevent back complaints in a user. The object of the present invention is also to improve a comfortable sitting, lying or sleeping position of the user.

[0026] A simple embodiment of the present device comprises a retaining bracket for securing an object against an underside of a sprung slat in order to adjust/set the stiffness of this sprung slat. Alternatively, the object is connected against an upper side of the sprung slat. Connecting against an underside is advantageous, since an existing arrangement, e.g. a mattress in a sofa bed, is not impeded. Traditionally, the sprung slat is mounted in a slatted base. 'Sprung slat', as used herein, is to be understood as a term known in the art, also known simply as 'slat', which denotes a carrier having a body as well as mattress supporting function within a slatted base or frame. Such a sprung slat can for instance be manufactured from wood, plastic, etc. 'Slatted base', as used herein, is to be understood as a term known in the art that denotes an assembly of body as well as mattress supporting parts, i.e., sprung slats, of a bed mounted in a slatted base frame. Traditionally, such a slatted base frame is substantially rectangular in shape and the sprung slats are extended transversely in several strips in this slatted base. Such a slatted base is often gripped by a frame, such as a frame of a bed, chair or sofa bed.

[0027] A traditional slatted base has the main function of evenly distributing the weight of a user so that they comfortably sit, lie down, sleep, etc. The inventors note that when a user has, for example, back complaints, it can however be very advantageous to adjust the stiffness of different slats within a slatted base. This makes it possible to optimise the local support of a mattress for each user. The inventors note that this results in back complaints being found much less. In addition, the inventors note that people with physiological disorders of the spine show fewer complaints, even after short-term use of the present invention.

[0028] A simple embodiment of the retaining bracket comprises at least a bottom portion, a first and second side wall portion, and an upper portion. Preferably, said bottom portion has a first end connected to a first end of said first side wall portion. Preferably, said bottom portion has a second end connected to a first end of said second side wall portion. Preferably, said upper portion has a first end connected to a second end of said first side wall portion. Preferably, said upper portion has a second end connected to a second end of said second side wall portion.

[0029] A simple embodiment of a slatted structure according to the present invention comprises a sprung slat, an object, preferably a sprung slat support, and a device

comprising the retaining bracket as described herein for adjusting the stiffness of said sprung slat. Within such a slatted structure, said object is connected to an underside of said sprung slat. Thus, the stiffness, also called the 'rigidity' or 'elastic deformability', of the slatted structure is determined by the stiffness of the sprung slat, the stiffness of the object as well as the force with which both are connected by the retaining bracket.

[0030] Traditionally, sprung slats have been curved along their longitudinal axis. Such curvature increases the stiffness of a sprung slat. Traditionally, such sprung slats are mounted in a slatted base such that the curvature points upwards. However, the inventors note that the stiffness or rigidity of such sprung slats can be further increased by also providing an upward directed curvature along a width axis of these slats.

[0031] In a preferred embodiment, at least a portion of an inner surface of said upper portion is curved away from said bracket retaining region. Such a configuration provides greater force on a central portion of the object and, consequently, also a central portion of the sprung slat. Such pressure distribution further increases the rigidity of the slat structure by providing a curvature of such slat along a width axis.

In a preferred embodiment, at least a portion of an inner surface of said bottom portion is curved toward said bracket retaining region. Such a configuration provides greater force on a central portion of the object and, consequently, also a central portion of the sprung slat. Such pressure distribution further increases the stiffness of the slat structure by means of a curvature of such slat along a width axis. Preferably, the curved bottom portion is a spring element. Such a spring element prevents damage to the sprung slat and/or the object through an even pressure distribution. Moreover, a better clamping can be obtained between the sprung slat and the object, so that they form a solid whole.

[0032] Depending on the dimensions of the sprung slat as well as the desired stiffness of the slatted structure, one or more retaining brackets can be connected to the same sprung slat. Furthermore, other connecting elements can also be used in addition to the retaining bracket. Examples include strips of textile, plastic, etc. that are clamped around the sprung slat and the object. In an illustrative embodiment, a retaining bracket can be connected to a central portion of a sprung slat. In addition, for example, two textile strips can then be connected to the end of the sprung slat for additional support. Ideally, however, two or more retaining brackets are connected at a distance on the sprung slat.

[0033] In a preferred embodiment of the slatted structure, an upper side of said sprung slat is connected to an upper portion of said retaining bracket. An upper side of said object is connected to the underside of said sprung slat. An underside of said object is connected against a bottom portion of said retaining bracket. Such a configuration is easy to install. If a sprung slat support is used as an object, no additional equipment is required besides the retaining bracket. However, it is apparent to one of ordinary skill in the art that one or more additional layers can be provided without extending beyond the object of the present invention. An example of an additional layer is a paper strip that can be placed between the sprung slat, the object and the retaining bracket to prevent, for example, damage due to friction between the sprung slat and the object. To practise the present invention, the slatted structure can be connected in a slatted base of, for example, a chair, bed or sofa bed.

[0034] Preferably, the retaining bracket is substantially cubic or beam-shaped. Alternatively, such a bracket may be cylindrical in shape. The optimal shape of the retaining bracket is determined by the shape of the sprung slat and the object. Traditionally, a sprung slat and sprung slat support are elongated and beam-shaped. An optimal complementary shape for such sprung slat and sprung slat support is substantially cubic or beam-shaped. In order to connect the retaining bracket to such sprung slat and sprung slat support, the sprung slat and sprung slat support must be joined together such that the longitudinal axis of both slats are parallel. The retaining bracket is subsequently positioned transverse to a longitudinal direction of the sprung slat and sprung slat support, i.e., the width axis of the retaining bracket is provided perpendicular to the longitudinal axis of the sprung slat and sprung slat support.

[0035] In order that the object can be attached to an already mounted sprung slat by means of the retaining bracket, it must be adjustable between an open position and a closed position. A simple embodiment of the retaining bracket is adjustable between an open position and a closed position by pivoting at least a portion of said retaining bracket. This makes the present invention easy to install. The bracket retaining region is enclosed by said bottom portion, said first and second side wall portions and said upper portion when said retaining bracket is in the closed position. In the open position of the retaining bracket, the bracket retaining region opens along an outer circumference.

[0036] Preferably, the adjustable portion of the retaining bracket pivots substantially in a frontal plane of the retaining bracket. Such a configuration is easy to manufacture and use. Alternatively, the adjustable portion of the retaining bracket can pivot in any plane. In a preferred embodiment, the retaining bracket is adjustable between the open position and the closed position by pivoting the adjustable portion of said retaining bracket outward from the bracket retaining region. In a particularly preferred embodiment, the retaining bracket is adjustable between the open position and the closed position by pivoting the upper portion of said retaining bracket outward from the bracket retaining area. Such a configuration opens up the bracket retaining region at an upper side allowing for easy insertion of the slats into the bracket. With an already mounted sprung slat, the upper portion can for instance be hooked onto the upper side of the sprung slat, after which the two side portions and the bottom portion

are clamped around the sprung slat and the object.

[0037] In a preferred embodiment, the retaining bracket is pivotally adjustable between the open position and the closed position by opening and closing said retaining bracket at a first and second closing end provided on said retaining bracket. Preferably, a locking device is provided at said first and second closing ends for securing said retaining bracket in a closed position. Such a configuration prevents the retaining bracket from falling open accidentally.

[0038] Preferably, said first closing end is provided with a male locking protrusion extending from said first closing end. Preferably, said second closing end is provided with a female locking recess adapted to receive said male locking protrusion when said retaining bracket is in the closed position. Such a configuration is easy to use and manufacture.

[0039] More preferably, an apical end of said male locking protrusion is curled at least partially toward an inner surface of said retaining bracket. More preferably, said female locking recess is provided with a retaining ridge extending from an outer surface of said female locking recess for retaining the curled apical end of said locking protrusion in said locking recess when said retaining bracket is in the closed position. Such a configuration is easy to use and manufacture.

[0040] Still further preferably, an apical end of said second closing end is provided with a clamping ridge perpendicular to a central outer circumference of said retaining bracket. The inventors note that such a configuration best restrains the male locking protrusion. Still further preferably, said second closing end also further provided with a locking device receiving opening extending through said retaining bracket and adjacent to said female locking recess. In order for the retaining bracket to be closed, the male locking protrusion must pass through the retaining bracket and into the locking recess. Such a configuration prevents the retaining bracket from falling open accidentally.

[0041] In a preferred embodiment, at least one of said first and second side wall portions is provided with a clamping ridge extending from an inner surface of the side wall portion. Such a clamping ridge positions the sprung slat as well as the object at the desired location in the bracket retaining region during clamping as well as while adjusting the retaining bracket from an open position to a closed position. Preferably, said clamping ridge is provided perpendicular to a central inner circumference of said retaining bracket. 'Central inner or outer circumference', as used herein, is to be understood as the cross-section of the central frontal plane with the retaining bracket. By providing a clamping ridge perpendicular to the central inner circumference, it is parallel to the longitudinal axis of the sprung slat or object, e.g., sprung slat support.

[0042] Preferably, said first and second side wall portions are provided with a first and second clamping ridge provided perpendicular to a central inner circumference of said retaining bracket. Still further preferably, said first and second side wall portions having a first and second clamping ridge are provided perpendicular to a central inner circumference of said retaining bracket at a clamping ridge spacing distance. Such a configuration provides a clamping ridge parallel to the longitudinal axis of the sprung slat as well as the object, i.e., sprung slat support. Preferably, the clamping ridge spacing distance is configured such that both clamping ridges are provided with respect to a central portion of the sprung slat and the object, e.g., sprung slat support.

[0043] In a preferred embodiment, the retaining bracket is substantially made of an elastic and/or resilient material. Such material prevents damage to the sprung slat and/or the object during clamping. In addition, such materials are extremely advantageous when combined with the locking device as described above. After all, such materials are deformable. In another preferred embodiment, the retaining bracket is substantially made of metal, such as aluminium. In a particularly preferred embodiment, the retaining bracket is substantially made of plastic. Metal and plastic are elastic, resilient, durable and can be easily recycled. Manufacturing the retaining bracket in one piece is possible with plastic, for example by means of a mould.

[0044] In a preferred embodiment, said upper portion is provided with a mattress protector backing extending from an outer surface of said upper portion.

[0045] In a preferred embodiment, said upper portion is provided with a widening provided substantially perpendicular to a central outer circumference of said retaining bracket. In what follows, the invention is described by way of non-limiting figures illustrating the invention, and which are not intended to and should not be interpreted as limiting the scope of the invention.

FIGURES

[0046] **Figures 1 to 12** relate to a preferred embodiment of a device comprising a retaining bracket. Furthermore, figures 1 to 12 also relate to a slatted structure and slatted base comprising the retaining bracket.

[0047] **Figures 1 and 2** show a perspective view of a slatted base (3) in a frame (45). The frame (45) can be, for example, a frame of a bed. The frame (45) shown in figures 1 and 2 is a frame for a sofa bed. Figure 1 shows a simple slatted base (3) without slatted structures (30) comprising the device with the retaining bracket (4). Figure 2 shows a slatted base (3) in which the stiffness of several sprung slats (1) is adjusted by connecting an object (2), in this case a support slat (2), to an underside (5) of said sprung slats (1). As is clear from figure 2, the slatted structures (30) are mounted on a central portion of the slatted base (3). As a result, for example, the stiffness of several sprung slats (1) can be adjusted corresponding to the back part of a user, so that back complaints, for example, decrease. This is extremely beneficial for a user with chronic back complaints. However,

it is clear to one of ordinary skill in the art that not only the central portion, as shown in figure 2, can be strengthened, but also various other portions of the slatted base (3), such as, for example, each portion of the slatted base (3) corresponding to a complaint region of a user.

[0048] **Figures 3 to 6** show an attachment of a sprung slat support (2) to a sprung slat (1) by means of a retaining bracket (4). Figure 3 shows a first step in which an upper side (32) of the sprung slat support (2) is arranged against an underside of the sprung slat (1). Figure 4 shows a situation in which the upper side (32) of the sprung slat support (2) has already been arranged against the underside of the sprung slat (1). Subsequently, the retaining bracket (4) should be arranged around both slats (1, 2). An upper side (31) of the sprung slat (1) should be connected to the upper portion (11) of the retaining bracket (4). Furthermore, an underside (46) of said object (2) should also be connected to the bottom portion (8) of the retaining bracket (4). To connect the retaining bracket (4) around both slats, it must be in an open position (6). Figure 5 shows the retaining bracket (4) before it is adjusted from an open position (6) to a closed position (7). Figure 6 shows the retaining bracket (4) in the closed position (7).

[0049] **Figures 7 to 12** show a detail of the attachment of a sprung slat support (2) to a sprung slat (1) by means of a retaining bracket (4). The retaining bracket (4) comprises a bottom portion (8), a first and second side wall portion (9, 10) and an upper portion (11). The bottom portion (8) has a first end (35) connected to a first end (36) of said first side wall portion (9). The bottom portion (8) has a second end (37) connected to a first end (38) of said second side wall portion (10). The upper portion (11) has a first end (39) connected to a second end (40) of said first side wall portion (9). The upper portion (11) has a second end (41) connected to a second end (42) of said second side wall portion (10).

[0050] The retaining bracket (4) is adjustable between an open position (6) and a closed position (7). The bracket retaining region (12) of the retaining bracket (4) is enclosed by said bottom portion (8), said first and second side wall portions (9, 10) and said upper portion (8) when said retaining bracket (4) is in the closed position (7). The retaining bracket (4) opens the bracket retaining region (12) along an outer circumference of said bracket retaining region (12) when said retaining bracket (4) is in the open position (6).

[0051] In the embodiment shown in figures 7 to 12, the retaining bracket (4) is pivotally adjustable between the open position (6) and the closed position (7) by opening and closing said retaining bracket (4) at a first and second closing end (19, 20) provided on said retaining bracket (4). A locking device (21) is provided at said first and second closing ends (19, 20) for securing said retaining bracket (4) in a closed position (7).

[0052] The locking device according to the embodiment shown in figures 7 to 12 comprises at the first closing end (19) a male locking protrusion (22) extending from said first closing end (19). At the second closing end (22), the locking device comprises a female locking recess (23) adapted to receive said male locking protrusion (22) when said retaining bracket (4) is in the closed position (7). The locking device is provided at the intersection between the first side wall portion (9) and the upper portion (11), i.e. the locking device is partially provided at the second end (40) of the first side wall portion (9) and partially provided at the one first end (39) of the upper portion (11). Such a configuration opens the bracket retaining region (12) at a corner of the retaining bracket (4) and thus the largest side of the retaining bracket (4) can be opened rotationally. Thus, both the sprung slat (1) and the object (2) can be easily placed in the bracket retaining region (12).

[0053] In more detail, an apical end (24) of said male locking protrusion (22) is curled at least partially toward an inner surface (34) of the retaining bracket (4). The apical end thus substantially corresponds to the second end (40) of the first side wall portion (9). In contrast, the female locking recess (23) is provided with a retaining ridge (25) extending from an outer surface (33) of said retaining bracket (4) to retain the curled apical end (24) of said male locking protrusion (22) in the female locking recess (23) when said retaining bracket is in the closed position (7). Thus, the female locking recess (23) substantially corresponds to the first end (39) of the upper portion (11). Such a configuration prevents, for example, undesired opening of the retaining bracket (4).

[0054] In more detail, an apical end (43) of said second closing end (20) is provided with a clamping ridge (26) perpendicular to a central outer circumference of said retaining bracket (4). Furthermore, the second closing end (20) is also provided with a locking device receiving opening (27) extending through said retaining bracket (4) and adjacent to said female locking recess (23). Such a configuration is adapted to receive the male locking protrusion (22) in the locking device receiving opening (27) such that the curled apical end of the male locking protrusion (22) can be restrained behind the retaining ridge (25) of the female locking recess (23). The inventors note that such a configuration better restrains the male locking protrusion (22). Moreover, such a retaining bracket (4) can only be opened when it is deliberately deformed by a user. In this respect, a retaining bracket (4) made substantially of an elastic material, such as for instance plastic or aluminium, is advantageous.

[0055] **Figures 7 to 10** show a sectional side view or a perspective view of the retaining bracket (4) around the sprung slat (1) and the sprung slat support (2). The retaining bracket (4) is in an open position (6) in these figures. An upper side (31) of the sprung slat (1) is connected in these figures to the upper portion (11) of the retaining bracket (4). Part of an inner surface (18) of the upper portion (11) is bent away from said enclosed bracket retaining region (12). Such a configuration minimises the contact area between the upper side (31) of the sprung slat (1) and the upper portion (11) of the retaining bracket

(4) and prevents, for example, damage to the sprung slat (1). The two side wall portions (9, 10) are provided with a first and second clamping ridge (13) provided perpendicular to a central inner circumference of said retaining bracket (4) at a clamping ridge spacing distance (15). Each of the two clamping ridges (13) extend from an inner surface (14) of a side wall portion (9, 10). Such a configuration ensures, among other things, that a sprung slat (1) is held in the correct position during installation, such that the retaining bracket (4) can be clamped around the sprung slat (1) without obstruction.

[0056] **Figures 11 and 12** show a sectional side view or a perspective view of the retaining bracket (4) around the sprung slat (1) and the sprung slat support (2). The retaining bracket (4) is in an open position (7) in these figures. An upper side (31) of the sprung slat (1) is connected to the upper portion (11) of the retaining bracket (4). An upper side (32) of the object (2) is connected to the underside (5) of the sprung slat (1). An underside (46) of the object (2) is connected to the bottom portion (8) of the retaining bracket (4). At least a portion of an inner surface (16) of the bottom portion (8) is curved toward the bracket retaining region (12). Such a configuration minimises the contact area between the underside (46) of the object (2) and the bottom portion (8) of the retaining bracket (4) and thus prevents damage to the sprung slat (1). The curved part of the inner surface (16) of the bottom portion (8) is a spring element (17) according to the present embodiment. The stiffness of the sprung slat (1) can be influenced by the spring element (17). For example, the stiffness of the sprung slat (2) will increase as the pressure exerted by the spring element (17) on the object increases. Such an arrangement is extremely advantageous when part of an inner surface (18) of the upper portion (11) is bent away from said enclosed bracket retaining region (12). After all, such a design allows the stiffness of the sprung slat (1) to be influenced on the one hand by the attached sprung slat support (2) and on the other hand by the spring element (17) which transfers a tension, i.e. deformation, via the sprung slat support (2) to the sprung slat (1).

[0057] The embodiment of the retaining bracket (4), shown in figures 7 to 12, further also comprises a widening (44) provided substantially perpendicular to a central outer circumference of the upper portion (11) of the retaining bracket (4). Such a widening (44) provides better support for the slats (1, 2) when they are clamped. The embodiment of the retaining bracket (4) is further also provided with a mattress protection backing (28) extending from an outer surface (14) of said upper portion (11). Such mattress protection backing (28) minimises the contact area of the mattress with the retaining bracket (4) and thus prevents damage to the mattress. Such an arrangement is extremely advantageous when combined with the widening (44) of the upper portion (11) as it better supports the mattress. Such an arrangement is extremely advantageous when combined with a locking device, as described above, which opens the retaining bracket (4) at an upper corner. After all, such a locking device may undesirably snag on the mattress and thus cause damage. By providing the retaining bracket (4) with an elevation as well as a widening (44) away from the locking device, such snagging is prevented, and the life of the mattress is extended.

[0058] Furthermore, the anatomical directions, as defined herein, of the device, i.e. the retaining bracket (4), are also indicated in figures 11 and 12. The 'Y direction' indicates a direction that is vertical when the retaining bracket is placed on a horizontal surface. Substantially, the Y direction denotes the height of the device. The 'Z direction' indicates a horizontal direction when the retaining bracket is placed on a horizontal surface. Substantially, the Z direction denotes the direction parallel to a direction of the bracket retaining region and perpendicular to the Y direction. Furthermore, the 'X direction' indicates a horizontal direction when the retaining bracket is placed on a horizontal surface. Substantially, this direction indicates the direction perpendicular to the Y direction and perpendicular to the Z direction.

[0059] The present invention should not be construed as being limited to the embodiments described above and certain modifications or changes may be added to the examples described without having to re-evaluate the appended claims.

Claims

1. Device for adjusting the stiffness of a sprung slat (1), preferably mounted in a slatted base (3), comprising a retaining bracket (4) for securing an object (2), preferably a sprung slat support (2), against said sprung slat (1), preferably against an underside (5) of said sprung slat (1), said retaining bracket (4) having a bottom portion (8), a first and second side wall portion (9, 10) and a upper portion (11), said bottom portion (8) having a first end (35) connected to a first end (36) of said first side wall portion (9), said bottom portion (8) having a second end (37) connected to a first end (38) of said second side wall portion (10), said upper portion (11) having a first end (39) connected to a second end (40) of said first side wall portion (9) and said upper portion (11) having a second end (41) connected to a second end (42) of said second side wall portion (10), **characterised in that** said retaining bracket (4) is adjustable between an open position (6) and a closed position (7) by pivoting at least part of said retaining bracket (4), wherein a bracket retaining region (12) is enclosed by said bottom portion (8), said first and second side wall portions (9, 10) and said upper portion (8) when said retaining bracket (4) is in the closed position (7) and wherein said bracket retaining region (12) opens along an outer circumference when said retaining bracket (4) is adjusted to the open position (6).

2. Device according to preceding claim 1, **characterised in that** said retaining bracket (4) is adjustable between the open position (6) and the closed position (7) by pivoting the upper portion (11) of said retaining bracket (4) outward from the bracket retaining area (12).

3. Device according to any of the preceding claims 1 or 2, **characterised in that** at least one, preferably two, of said first and second side wall portion (9, 10) is provided with a clamping ridge (13) extending from an inner surface (14) of the side wall portion (9, 10).

4. Device according to previous claim 3, **characterised in that** said first and second side wall portions (9, 10) are provided with a first and second clamping ridge (13) provided perpendicular to a central inner circumference of said retaining bracket (4) at a clamping ridge spacing distance (15).

5. Device according to any of the preceding claims 1 to 4, **characterised in that** at least part of an inner surface (16) of said bottom portion (8) is curved towards said bracket retaining region (12), preferably wherein the curved bottom portion is a spring element (17).

6. Device according to any of the preceding claims 1 to 5, **characterised in that** at least part of an inner surface (18) of said upper portion (11) is curved away from said bracket retaining region (12).

7. Device according to any of the preceding claims 1 to 6, **characterised in that** said retaining bracket (4) is pivotally adjustable between the open position (6) and the closed position (7) by opening and closing said retaining bracket (4) at a first and second closing end (19, 20) provided on said retaining bracket (4) and wherein a locking device (21) is provided on said first and second closing end (19, 20) for securing said retaining bracket (4) in a closed position (7).

8. Device according to previous claim 7, **characterised in that** said first closing end (19) is provided with a male locking protrusion (22) extending from said first closing end (19) and wherein said second closing end (22) is provided with a female locking recess (23) adapted to receive said male locking protrusion (22) when said retaining bracket (4) is in the closed position (7).

9. Device according to preceding claim 8, **characterised in that** an apical end (24) of said male locking protrusion (22) is curled at least partially towards an inner surface (34) of said retaining bracket (4) and wherein said female locking recess (23) is provided with a retaining ridge (25) extending from an outer surface (33) of said female locking recess (23) for restraining the curled apical end (24) of said locking protrusion (22) in said locking recess (23) when said retaining bracket is in the closed position (7).

10. Device according to any of the preceding claims 7 to 9, **characterised in that** an apical end (43) of said second closing end (20) is provided with a clamping ridge (26) perpendicular to a central outer circumference of said retaining bracket (4) and wherein said second closing end (20) also further includes a locking device receiving opening (27) extending through said retaining bracket (4) and adjacent to said female locking recess (23).

11. Device according to any of the preceding claims 1 to 10, **characterised in that** said upper portion (11) is provided with a widening (44) provided substantially perpendicular to a central outer circumference of said retaining bracket (4).

12. Device according to any of the preceding claims 1 to 11, **characterised in that** said upper portion (11) is provided with a mattress protection backing (28) extending from an outer surface (14) of said upper portion (11).

13. Slat structure (30) comprising a sprung slat (1), an object (2), preferably a sprung slat support (2), and a device comprising a retaining bracket (4) according to any of the preceding claims 1 to 12 for adjusting the stiffness of said sprung slat (1), preferably wherein said object (2) is connected to an underside (5) of said sprung slat (1).

14. Slat structure (30) according to preceding claim 13, **characterised in that** an upper side (31) of said sprung slat (1) is connected to an upper portion (11) of said retaining bracket (4), wherein an upper side (32) of said object (2) is connected to the underside (5) of said sprung slat (1) and wherein an underside (46) of said object (2) is connected to a bottom portion (8) of said retaining bracket (4).

15. Slatted base (3) comprising a sprung slat (1) connected to an object (2), preferably a sprung slat support (2), and a device according to any of the preceding claims 1 to 12 and/or a slatted structure (30) according to any of the preceding claims 13 or 14.

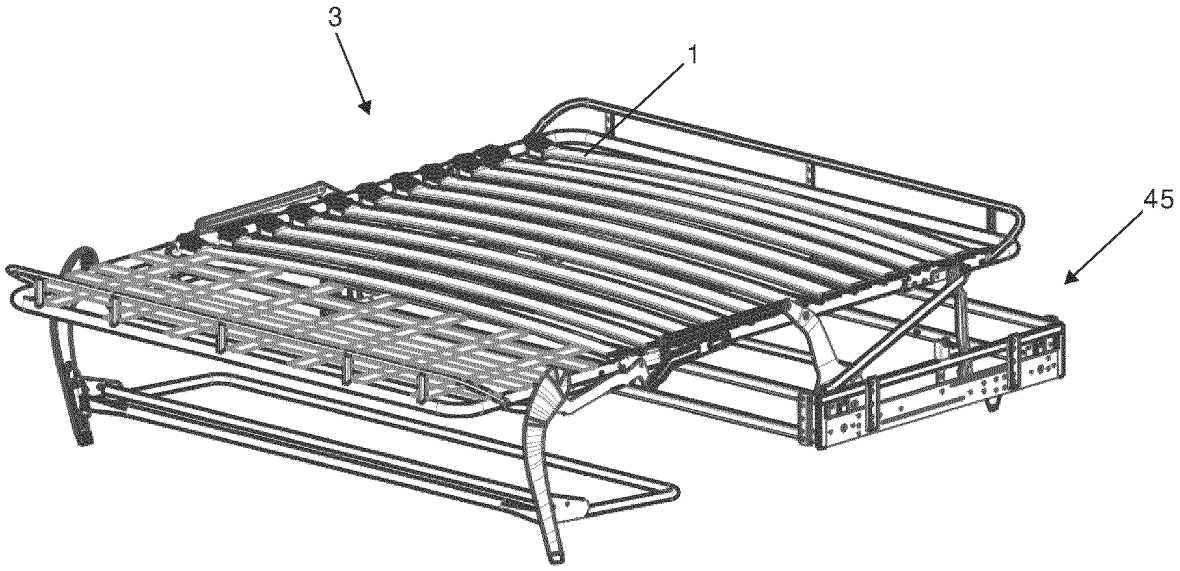


Fig. 1

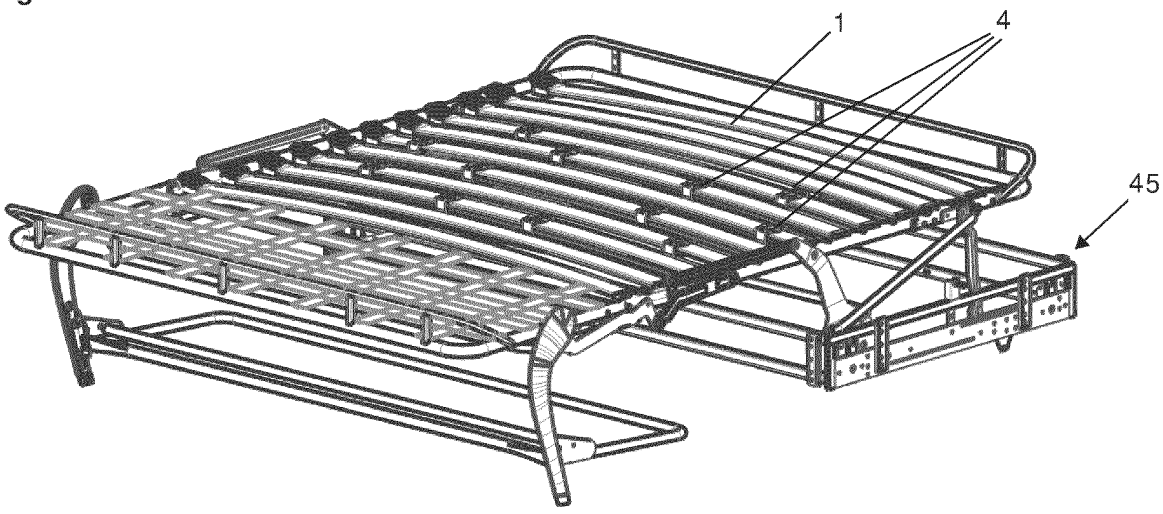


Fig. 2

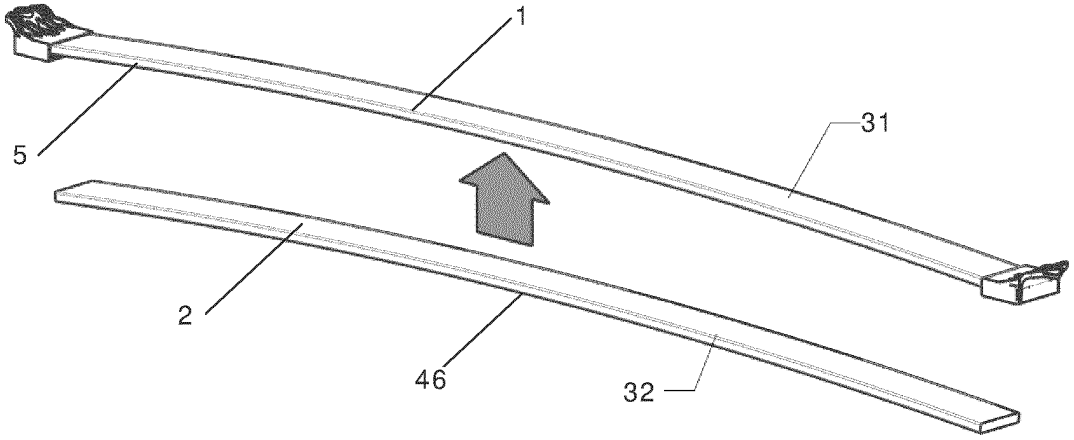


Fig. 3

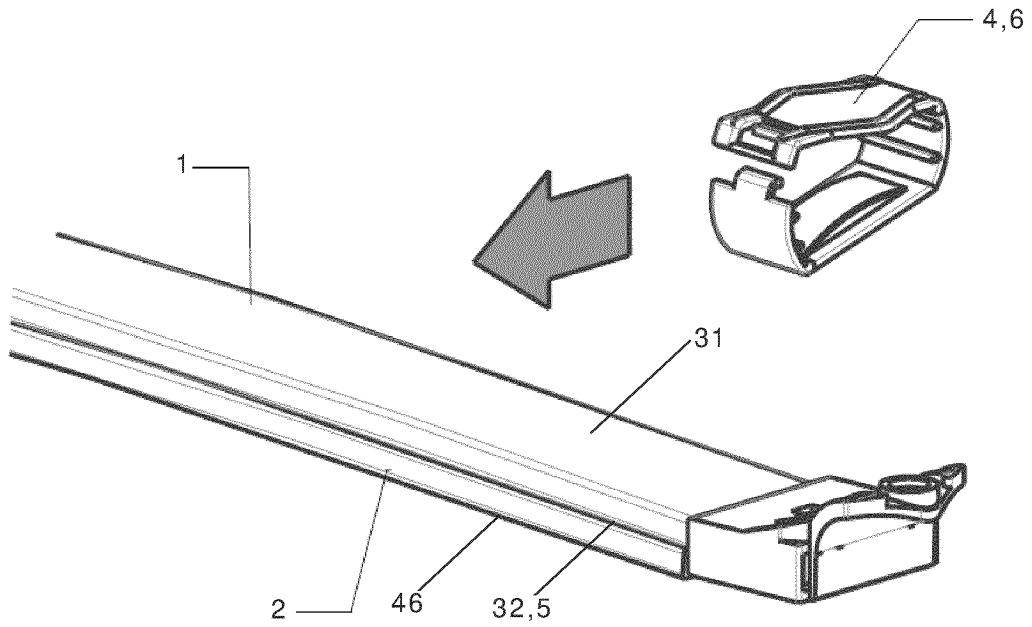


Fig. 4

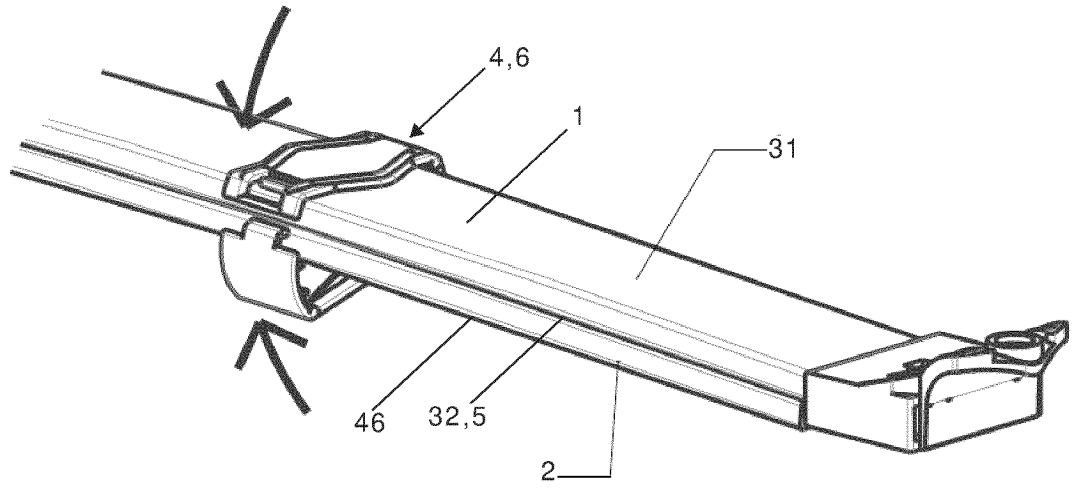
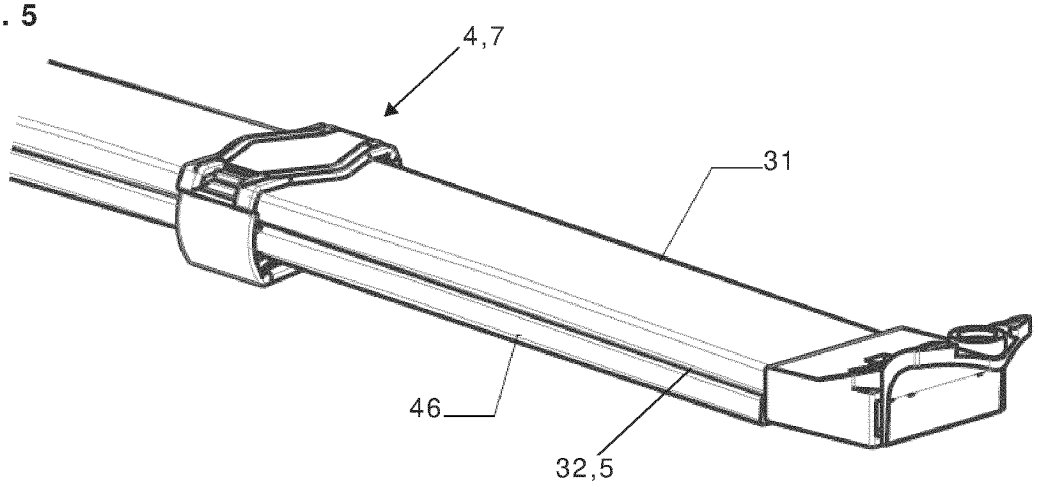


Fig. 5



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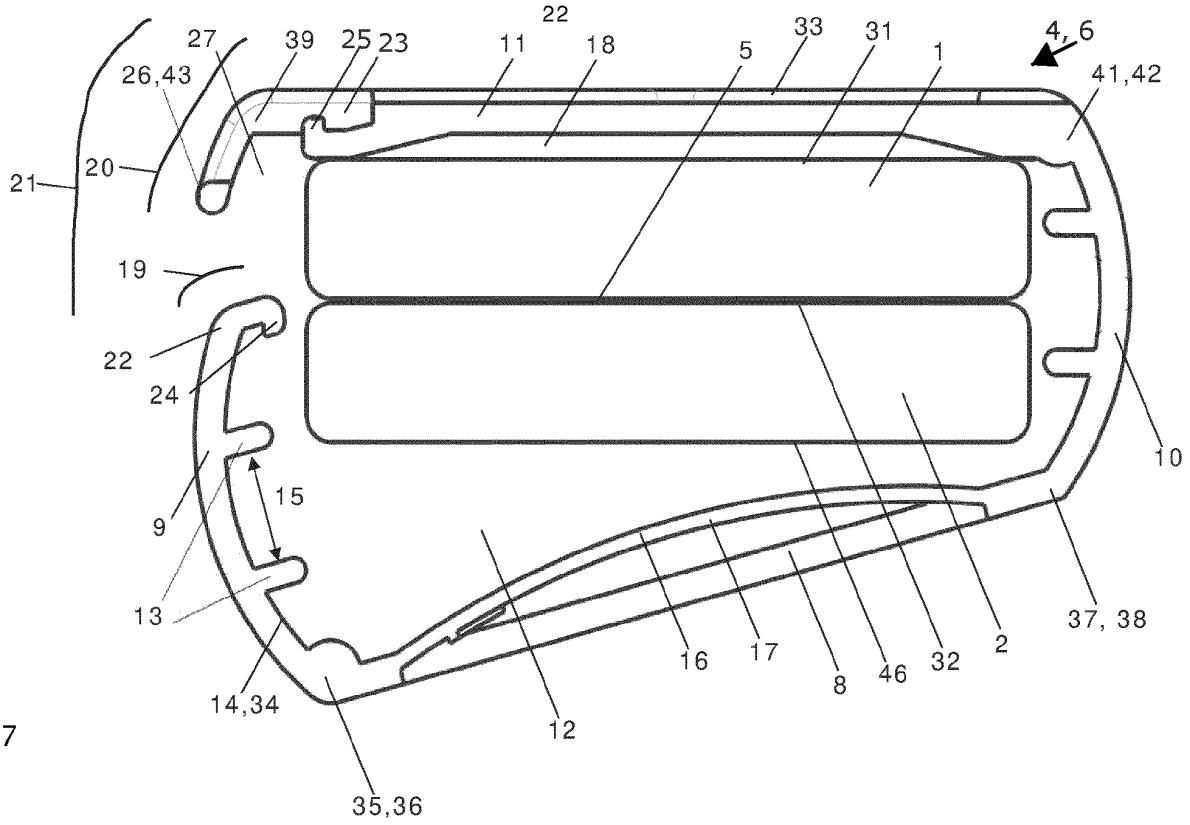
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Fig. 7

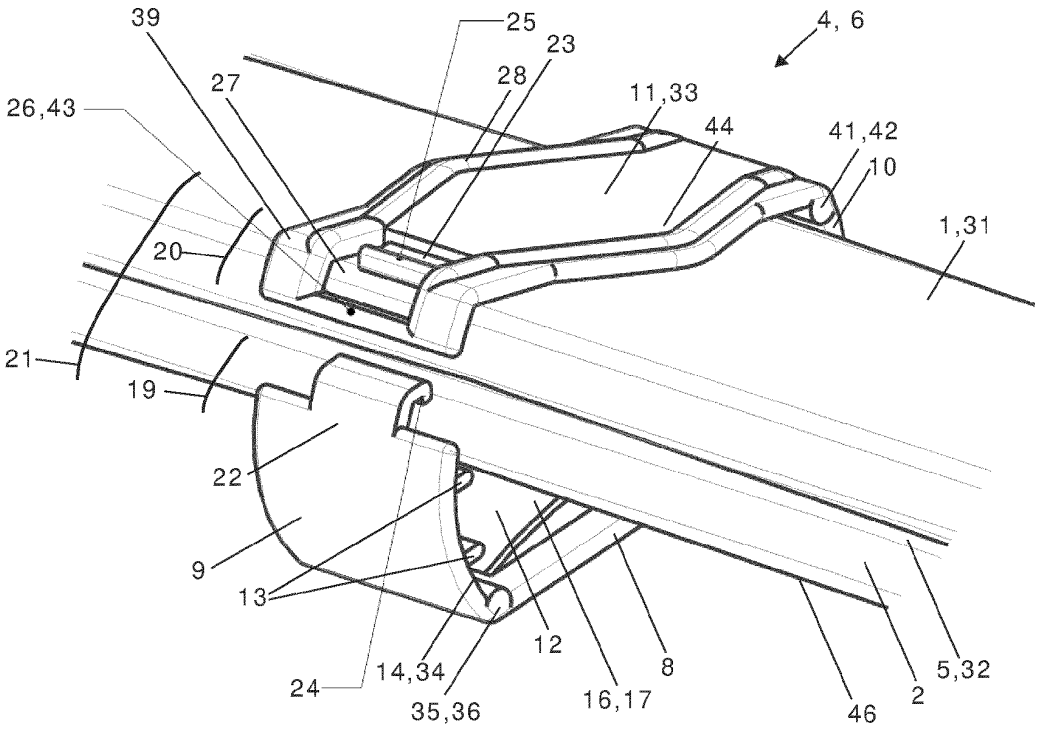
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Fig. 8

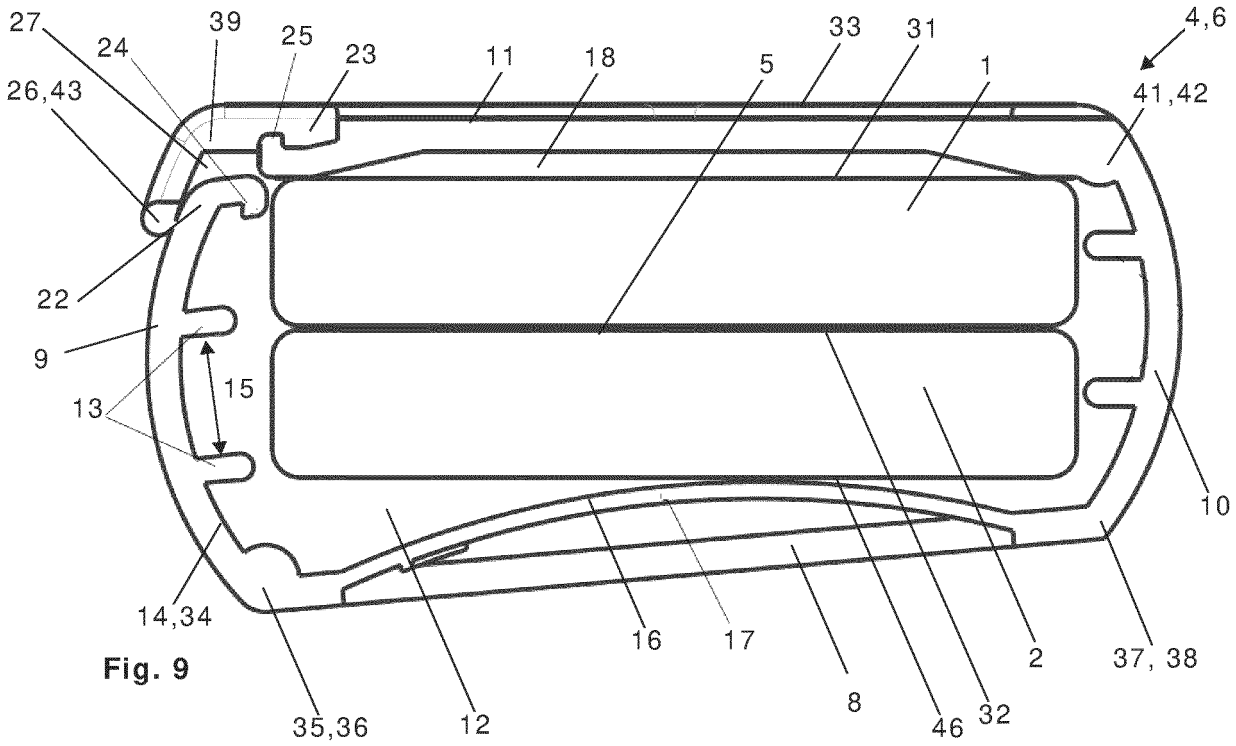
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Fig. 9

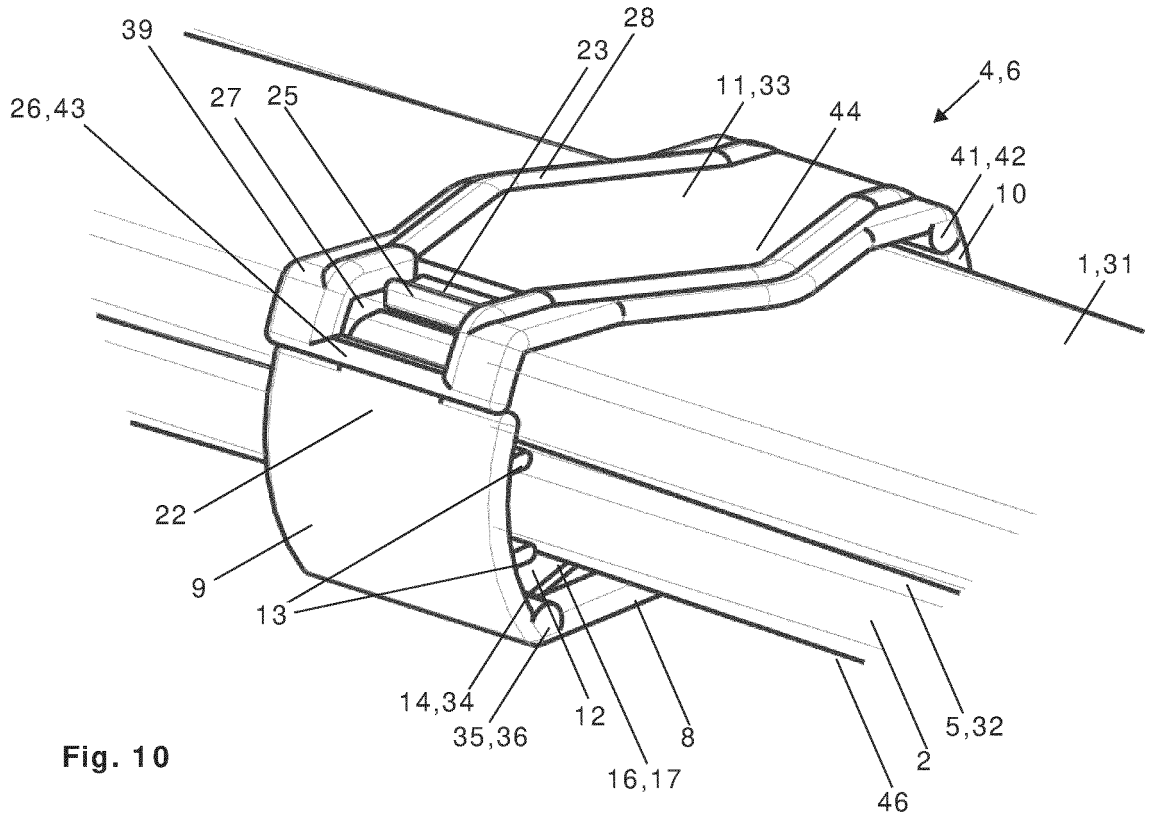
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Fig. 10

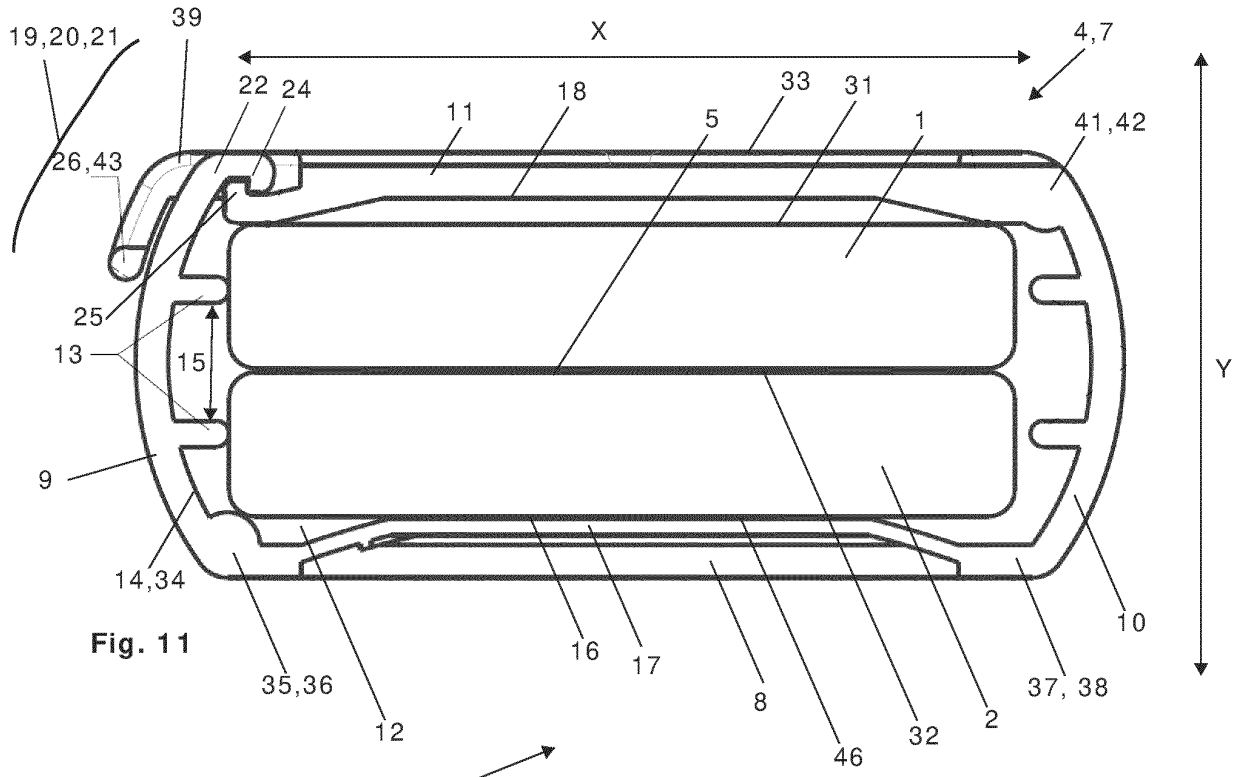
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Fig. 11

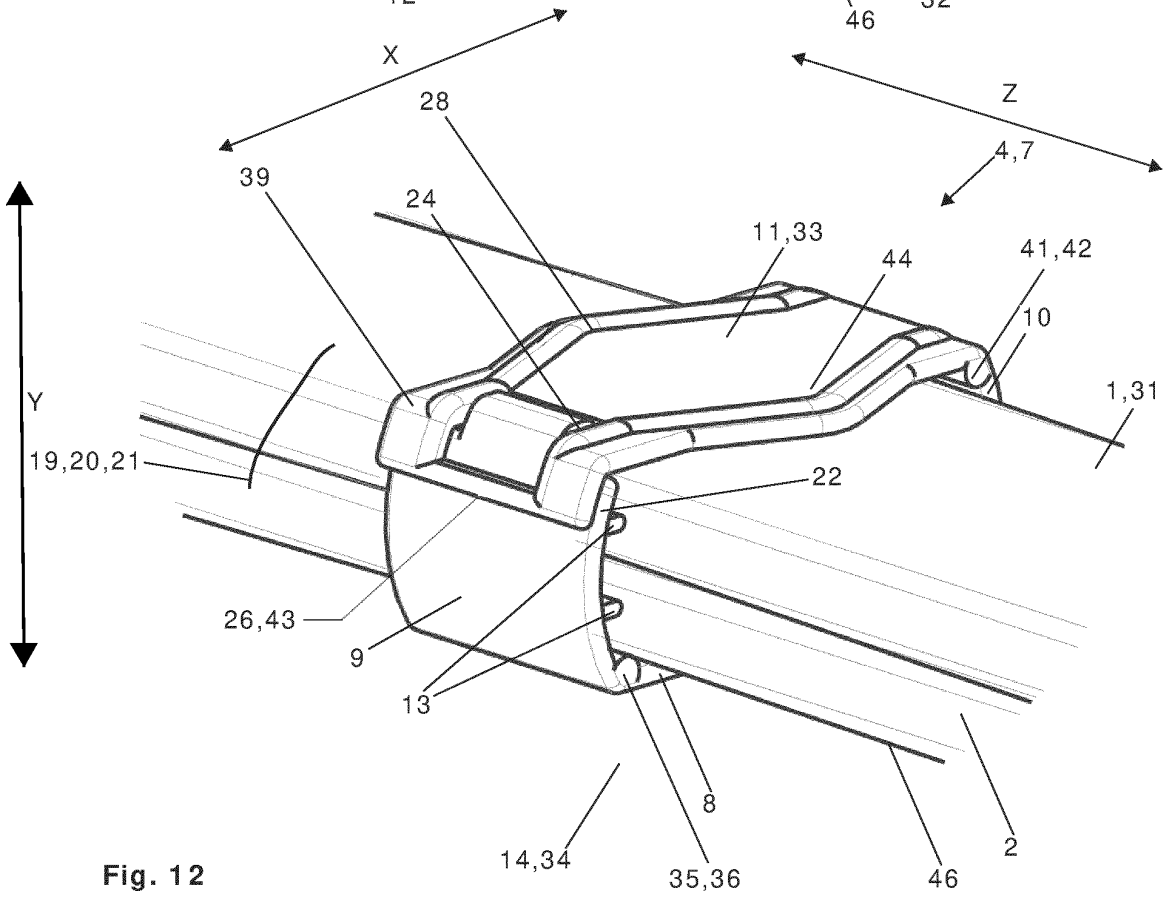
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Fig. 12

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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
The Hague	15 June 2021	Kus, Slawomir

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