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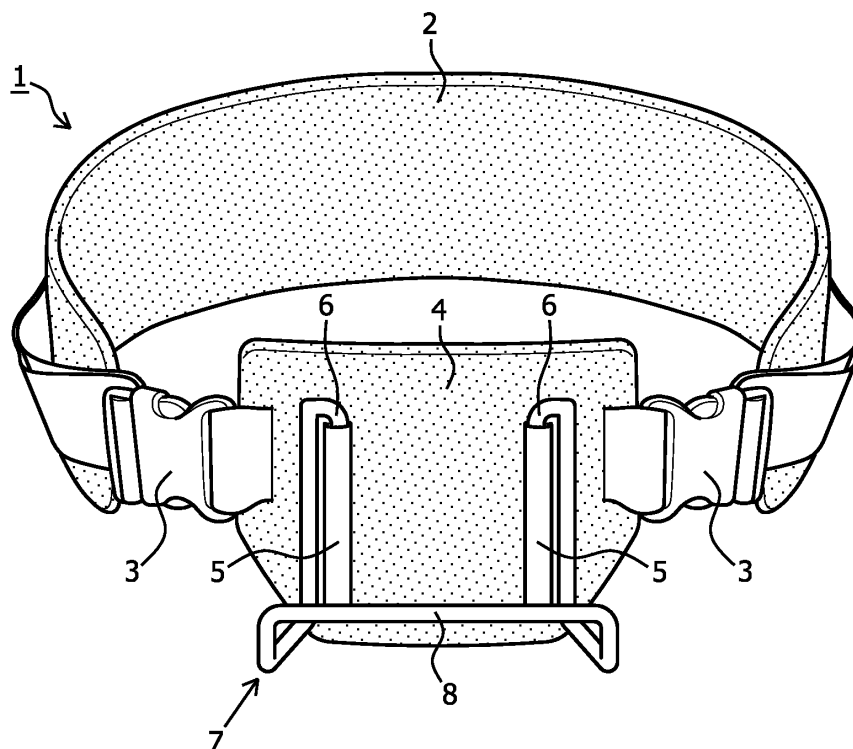
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(54) **Device for carrying objects**

(57) The invention relates to a device for carrying objects (1), comprising: a belt (2) which can be fastened releasably round the torso of a person, a carrying structure formed by a single component and provided with at

least two coupling elements (6) located at a mutual distance, and counter-coupling means (5) connected to the belt and located at a mutual distance via a flexible structure (4) for releasable engagement and support of the carrying bracket.



**FIG. 1**

## Description

**[0001]** The invention relates to a device for carrying objects, provided with a belt which can be fastened releasably round the torso of a person and with which objects to be carried by hand can be at least partially supported.

**[0002]** Occupations in which objects must be carried frequently are physically taxing. It is possible here to envisage occupations such as home remover, builder, courier and farmer. The physical load of such occupations is considerably greater than the national average for all occupations. The risk of structural and permanent injury is therefore relatively high for such occupational groups. The lifting of heavier objects in particular can result in back problems. Back problems are therefore a major cause of sickness absence and incapacity for work. During lifting the muscles on the rear side of the body are loaded, and particularly the back muscles. When the back becomes overloaded, this may for instance result in damage to the back muscles, the ligaments or to the intervertebral discs. It is the case here that the heavier the weight which is lifted, the higher the risk of back disorders. The lifting of light objects can however also cause damage to the back, for instance due to an incorrect posture, lifting for too long or too often.

**[0003]** Diverse aids are available for the purpose of lightening the physical load. It is possible here to envisage forklift trucks, hoists, cranes, carts, jacks and harnesses. Research shows that too little use is made of such aids. This is particularly the case when lifting relatively lighter loads in the order of magnitude of 25 kilograms or less. It is precisely the lifting of such lighter loads which has been found to be the cause of many back problems. Aids for lifting lighter loads are also already available.

**[0004]** The American patent application US 2007/0017945 thus describes a lifting and carrying aid consisting of a belt to which an arcuate support member is attached, to which at least one carrying member is fixed for the purpose of supporting the objects for carrying. The carrying member, or the carrying members, can be folded from a working position to a stored position. A drawback of the described construction is that objects can easily slide off the carrying member and that the lifting and carrying aid is less easy in use and during transport and storage.

**[0005]** The invention has for its object to provide an improved device for carrying objects, in particular lighter objects, whereby objects can be supported by a carrying structure connected to a belt while retaining the advantages of the prior art, wherein both the wearer comfort and convenience of use increase.

**[0006]** The invention provides for this purpose a device for carrying objects, comprising: a belt which can be fastened releasably round the torso of a person, a carrying structure formed by a single component and provided with at least two coupling elements located at a mutual

distance, and counter-coupling means connected to the belt and located at a mutual distance via a flexible structure for releasable engagement and support of the carrying structure. It is particularly desirable here that, when the belt with coupled carrying structure is being worn, the carrying structure comprises a bearing edge lying substantially horizontally, which bearing edge is located a distance from the belt. An important advantage of the releasable carrying structure is that it does not have to be coupled to the belt during transport and storage. It is moreover easy to replace the belt or the carrying structure if it does not function or is not suitable for determined conditions of use. Due to the coupling elements located at a mutual distance it is still possible to obtain a stable coupling between belt and carrying structure. Another advantage is that, because the counter-coupling means also lie at a mutual distance via a flexible structure (since they must co-act with the coupling means located at a mutual distance), the form in which the belt fits to the body of a user will be unrestricted; it is not obstructed by a preformed plate or bracket connecting to the body. Not only does this make it possible for users of varying posture to use the device without problem, it is also possible that the carrying structure can be positioned as required in a desired position. It is possible here to envisage a ventral, dorsal or lateral positioning of the carrying structure relative to the torso of a user. The moment effect of gravitational force of the object on the back is hereby reduced considerably. Analysis hereof shows that forces on the back for the lifting of a standard removal box become a minimum of four times lower with the device according to the invention. In addition, the device makes it possible to prevent an incorrect posture during carrying. The invention will hereby be able to make a significant contribution toward the reduction of back disorders. Another advantage of the releasable coupling of the carrying structure and the belt is that, in the case of an incorrect or excessive loading of the belt by the carrying structure, it is possible that they uncouple; this provides the user with an additional safeguard against undesired load.

**[0007]** The advantage of the substantially horizontally located bearing edge which, when the belt is worn with coupled carrying structure, is situated at a distance from the belt, is that a stable support of an object can thus be obtained, wherein the object will less easily slide/slip off the carrying structure. It is even possible to envisage the carrying structure being specifically preformed for co-action with objects specifically formed on the underside. By allowing the object for lifting to rest on the carrying structure, the load resulting from the object will be transmitted for the greater part through the hips.

**[0008]** Netherlands patent NL1021311 describes a device for holding a holder on the front side of the human body, at the position of the stomach. As already indicated in the title, this is a device which is less flexible in use since it has been given such a rigid design that it is only suitable for ventral use. Another important difference is that the supporting part of the carrying structure of this

device is formed by a flat plate which continues as far as the belt. Not only does this illustrate that the shown device can be used in only one orientation relative to the body, but the plate continuing as far as the belt moreover forms a supporting surface from which objects for supporting will slide/slip in relatively simple manner compared to the present invention. A platform as carrying surface appears in the first instance to have the advantage that the pressure of an object for carrying with a flat underside is distributed over a larger surface area. This is however found not to be the case in practice, since account must be taken of tilting of the carrying surface.

**[0009]** The American patent US 5,221,032 shows a holder tray positioned some distance from a carrying strap by spacers, although it also discloses that the strap connects to a preformed support member of a fixed form. This form matches the form of the holder tray. In addition to the drawback that this construction is also less flexible in use due to the preformed construction, the hereby realized support of objects will also be less stable. The carrying bracket shown in US 2005/0161479 for attaching to an existing belt is also provided with a preformed, curved surface which must lie against the human body, and is thereby less flexible in use than the present invention. Furthermore, the belt is not adapted here for specific co-action with a support member.

**[0010]** It is advantageous if the carrying structure is embodied as a carrying bracket. This is for instance possible if the carrying structure is manufactured from a rod-like material. The carrying structure can thus be bent, curved or welded from a (metal) rod material which can take a hollow or solid form depending on the application and dimensioning. Such a carrying structure is relatively light and moreover provides the option of a reliable engagement on objects for supporting.

**[0011]** It is of course also possible to provide the device with a plurality of differently dimensioned carrying structures, all provided with at least two coupling elements located at a mutual distance and adapted for releasable engagement on the counter-coupling means forming part of the belt. It is thus possible to vary the carrying structure being used for a determined purpose. The coupling elements of all carrying structures desirably take a uniform, or at least substantially uniform, form here such that all carrying structures can co-act with the same belt. Conversely, it is also possible to embody the device with a plurality of belts which are all provided with identical counter-coupling means. It is thus possible to vary the belt for a specific purpose or a specific type of user.

**[0012]** The coupling elements can take varying forms. A simple embodiment variant relates to coupling elements with an elongate form which desirably run parallel to each other. Such coupling elements can co-act in very simple manner with counter-coupling means comprising two spaced apart insertion openings for the coupling elements. The coupling elements can thus be easily inserted into the counter-coupling means from above.

**[0013]** It is further advantageous if the coupling ele-

ments can be coupled rotatably to the counter-coupling means. During deformation of the belt the coupling of coupling elements and counter-coupling elements can thus co-rotate and the build-up of unnecessary stresses in the device is prevented. This also results in a further improvement in the fitting of the belt to the body of a user.

**[0014]** In yet another embodiment variant, when the belt is being worn the counter-coupling means are adapted such that the coupling means can be inserted on the cranial side of the belt. This means in other words that in the case of a standing user the coupling means can be inserted into the counter-coupling means on the top side. The coupling hereby does not require locking, since the gravitational force ensures that the coupling means do not release in undesired manner from the counter-coupling means.

**[0015]** In yet another advantageous embodiment variant the device is provided with at least one resilient element connected to the carrying bracket. Peaks in the load on the user can hereby be absorbed, which results in more comfortable use.

**[0016]** The carrying bracket can optionally also be provided with a carrying structure with a flattened side or optionally even a carrying surface of limited size. With this measure the local maximum loading of the surface of an object for supporting can be reduced. This is particularly desirable if the objects for supporting are fragile compared to their weight. For an improved engagement on the object for supporting the carrying structure can also be provided at least on the contact side with a profiled surface. Such a profiled surface can for instance consist of one or more thickened portions or recesses. This can result in a more stable positioning of the objects or articles for carrying or lifting, and the frictional resistance between the carrying structure and the object can increase.

**[0017]** In order to enable a simple sideward displacement of the carrying structure without uncoupling the carrying structure from the belt, it is advantageous for the assembly of belt and carrying bracket to be provided with a hinge whereby the bracket is pivotable against the belt.

**[0018]** In order to prevent excessive local pressure on the body of the user the belt can be provided on the side to be turned toward the wearer with a deformable supporting element, at least at the position of the counter-coupling means. The forces exerted on the belt via the carrying bracket will thus be transmitted to the body of a wearer via the deformable supporting element (for instance a 'cushion-like' thickening). The belt is otherwise desirably also provided with a releasable closure, for instance in the form of a buckle or rapid-action closure.

**[0019]** The invention will be further elucidated on the basis of the non-limitative exemplary embodiments shown in the following figures. Herein:

figure 1 is a perspective view of an embodiment variant of the device according to the present invention; figure 2A is a perspective view of a second embodiment variant of the device according to the invention;

figure 2B is a perspective view of a part of the second embodiment variant of the device shown in figure 2A, with exploded parts;

Figure 2C is a perspective view of a part of the second embodiment variant of the device shown in figure 2A, now however in a variant in which a carrying structure is worn on the side;

figure 3A shows a schematic view of a person lifting a removal box without aids;

figure 3B shows a schematic view of a person lifting a moving box using a device according to the present invention;

figures 4A-4C show different schematic cross-sections of devices according to the invention in a situation where they are coupled to persons of varying posture; and

figures 5A and 5B show schematic side views of the load on two embodiment variants of the carrying device according to the invention.

**[0020]** Figure 1 shows a carrying device 1 with a belt 2 which is provided with two rapid-action couplings 3 with which the belt can be opened and closed and with which the length thereof can also be adjusted. Situated between the two rapid-action couplings 3 is a deformable supporting part 4, which as such also forms part of belt 2. Arranged on this supporting part 4 are two loops 5 which function as counter-coupling elements for coupling rods 6 (only the top sides thereof are visible since these are not inserted into loops 5). Coupling rods 6 form part of a carrying structure 7 in the form of a carrying bracket. A contact edge 8 forming part of carrying structure 7 lies at a distance from belt 2 (and more particularly the deformable supporting part 4 forming part of belt 2), whereby an object can be supported in advantageous manner. Carrying structure 7 can be released in simple manner from belt 2 by being moved upward such that coupling rods 6 slide out of loops 5. Carrying structure 7 can then for instance be replaced by another carrying structure 7, although this measure is also advantageous during production, storage, transport etc. of carrying device 1.

**[0021]** Figure 2A shows a carrying device 20 provided with a belt 21 with a buckle 22 with which belt 21 can be arranged around the body of a user (not shown). The belt is coupled to a carrying structure 23. Figure 2B also shows this carrying structure 23 coupled to belt 21, here however without buckle 22 being shown. Belt 21 is provided with two counter-coupling elements 24 connected at a distance from each other to belt 21. Carrying structure 23 consists of an element which is manufactured from rod material and provided with two parallel elongate coupling elements 25 which can be inserted into openings 26 recessed for this purpose into counter-coupling elements 24. Fixation elements 27 are provided for the purpose of fixing coupling elements 25 in openings 26. For increased wearer comfort a deformable (flexible) supporting element 28 is moreover provided which will prevent tilting of carrying structure 23. Openings 29 are

also arranged in this supporting element 28 for passage of coupling elements 25.

**[0022]** Figure 2C shows carrying device 20, here however in a situation where carrying structure 23 and counter-coupling elements 24 are located on the side of belt 21, this being advantageous in the supporting of longer and other objects. The carrying surface is here supported on a side (see figure 2E).

**[0023]** Figure 2D shows carrying device 20 in an imaginary situation of use, this meaning that the user has been omitted for the sake of clarity. Carrying device 20 here supports a removal box 30 on the front side of an imaginary user.

**[0024]** Figure 2E shows carrying device 20, again in an imaginary situation of use, but here in a situation where two beams 31 rest on carrying device 20 such that they are situated to a side of a user.

**[0025]** Figure 3A shows the posture of a person 40 carrying a removal box 30 without aids.

20 Figure 3B shows the same person 40, here however lifting removal box 30 using a device 20 according to the invention and as shown in figure 2A. Figure 3C once again shows a person 40, here lifting two beams 31 to one side using a device 20 according to the invention and as shown in figure 2E.

**[0026]** Figures 4A-4C show illustrations of different schematic cross-sections of carrying devices 20 according to the present invention of various users, which illustrate clearly that the flexibility of the present invention makes it usable by persons of varying posture. For the sake of clarity the carrying devices 20 are provided in each case with two carrying structures 23 in order to indicate that they can be worn in front of the stomach as well as to the side.

35 **[0027]** Figures 5A and 5B show by way of elucidation the difference between a contact surface 45 fixed above belt 21 (fig. 5A) and a contact surface 46 fixed below belt 21 (fig. 5B). Both variants are drawn in schematic side view. The effect of gravitational force (arrows P1) on carrying surfaces 45, 46 can further be seen. The moment produced by this gravitational force around tilting points 47, 48 is also shown. It is apparent that there is a great difference between the distance from the two tilting points 47, 48 to belts 21. In a situation as shown in figure 5B belt 21 hereby contributes more toward preventing tilting of the carrying surface than the situation as shown in figure 5A.

45 **[0028]** The active part of carrying structure 23 with which an object for supporting is engaged (the 'contact surface' 45, 46) can advantageously be positioned under or at least close to the underside of belt 21. Belt 21 hereby makes a maximum contribution toward preventing tilting of carrying structure 23. Figures 5A and 5B show the difference in the play of forces. It is important that the distance from the centre of rotation 47, 48 to belt 21 is many times greater in the case of a carrying surface 46 attached under belt 21.

This results in a greater moment arm which the belt 21

"uses", and so makes a greater contribution toward preventing tilting of carrying structure 23. The result hereof is that, when a carrying surface 46 is attached under belt 21, fewer forces have to be absorbed directly by the body. In addition, it is important that, in the case of a carrying surface 45 attached above belt 21, the carrying surface 45 will tend to rotate away from the body (under the influence of the mass of the object for carrying), while in the case of a carrying surface 46 attached under belt 21, the carrying surface 46 will conversely tend to rotate toward the body. This is a crucial difference. This is because, when carrying surface 45 rotates away from the body, the moment arm (distance from the body to the line of action of the combined normal force from the centre of gravity of the object for carrying), and so the tilting moment, will increase. The centre of gravity of the object does after all hereby come to lie further away from the body. The result is an even greater tendency to tilt further. In the case of a carrying surface 46 attached under belt 21 the tendency toward further tilting will decrease. This is because the centre of gravity of the object comes to lie closer to the body when the carrying surface tilts, with the result that the moment arm (from the body to the combined line of action of gravitational force) of the object decreases.

## Claims

1. Device for carrying objects, comprising:
  - a belt which can be fastened releasably round the torso of a person,
  - a carrying structure formed by a single component and provided with at least two coupling elements located at a mutual distance, and
  - counter-coupling means connected to the belt and located at a mutual distance via a flexible structure for releasable engagement and support of the carrying structure.
2. Device as claimed in claim 1, **characterized in that** when the belt with coupled carrying structure is being worn, the carrying structure comprises a bearing edge lying substantially horizontally, which bearing edge is located a distance from the belt.
3. Device as claimed in claim 1 or 2, **characterized in that** the carrying structure is a carrying bracket.
4. Device as claimed in any of the foregoing claims, **characterized in that** the device is provided with a plurality of differently dimensioned carrying structures, all provided with at least two coupling elements located at a mutual distance and adapted for releasable engagement on the counter-coupling means forming part of the belt.
5. Device as claimed in any of the foregoing claims, **characterized in that** the coupling elements take an elongate form.
6. Device as claimed in claim 5, **characterized in that** the elongate coupling elements run parallel to each other.
7. Device as claimed in any of the foregoing claims, **characterized in that** the counter-coupling means form part of the belt and comprise two spaced apart insertion openings for the coupling elements.
8. Device as claimed in any of the foregoing claims, **characterized in that** the coupling elements can be coupled rotatably to the counter-coupling means.
9. Device as claimed in any of the foregoing claims, **characterized in that** when the belt is being worn the counter-coupling means are adapted such that the coupling means can be inserted on the cranial side of the belt.
10. Device as claimed in any of the foregoing claims, **characterized in that** the device is provided with at least one resilient element connected to the carrying bracket.
11. Device as claimed in any of the foregoing claims, **characterized in that** the carrying structure is manufactured from a rod-like material.
12. Device as claimed in any of the foregoing claims, **characterized in that** the carrying bracket is provided with a carrying surface.
13. Device as claimed in any of the foregoing claims, **characterized in that** the carrying bracket is provided at least on the contact side with a profiled surface.
14. Device as claimed in any of the foregoing claims, **characterized in that** the assembly of belt and carrying bracket is provided with a hinge whereby the bracket is pivotable against the belt.
15. Device as claimed in any of the foregoing claims, **characterized in that** the belt is provided on the side to be turned toward the wearer with a deformable supporting element, at least at the position of the counter-coupling means.

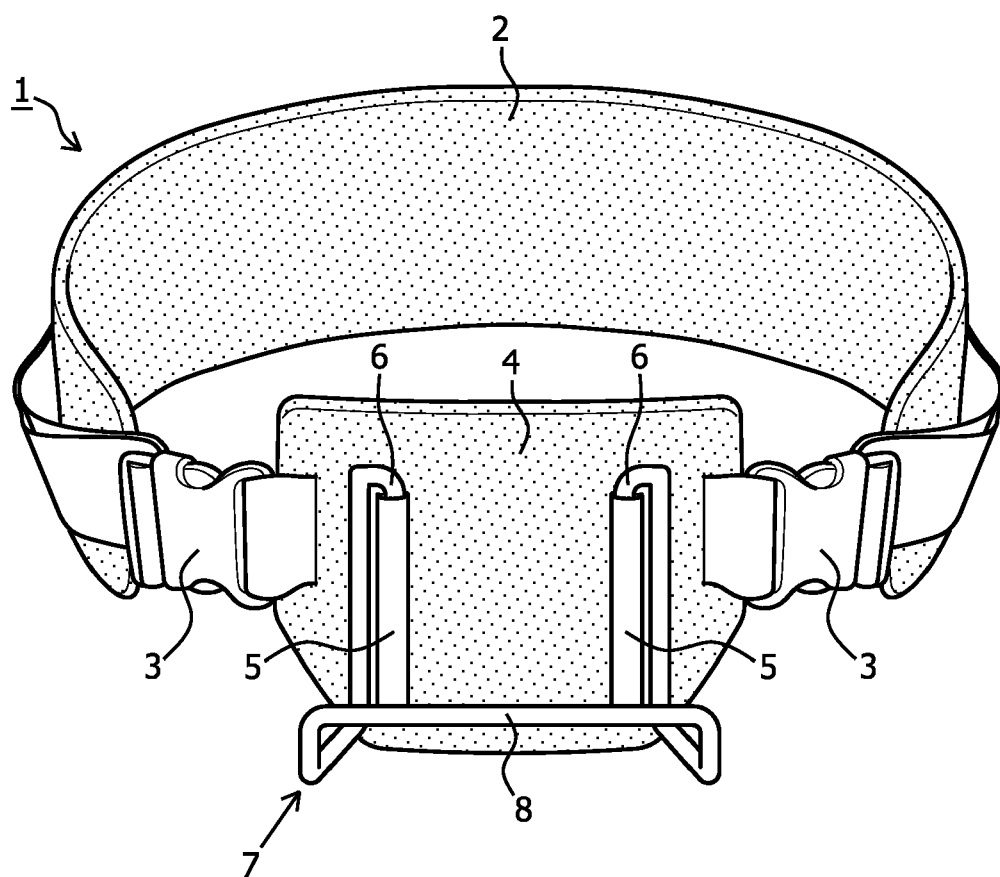


FIG. 1

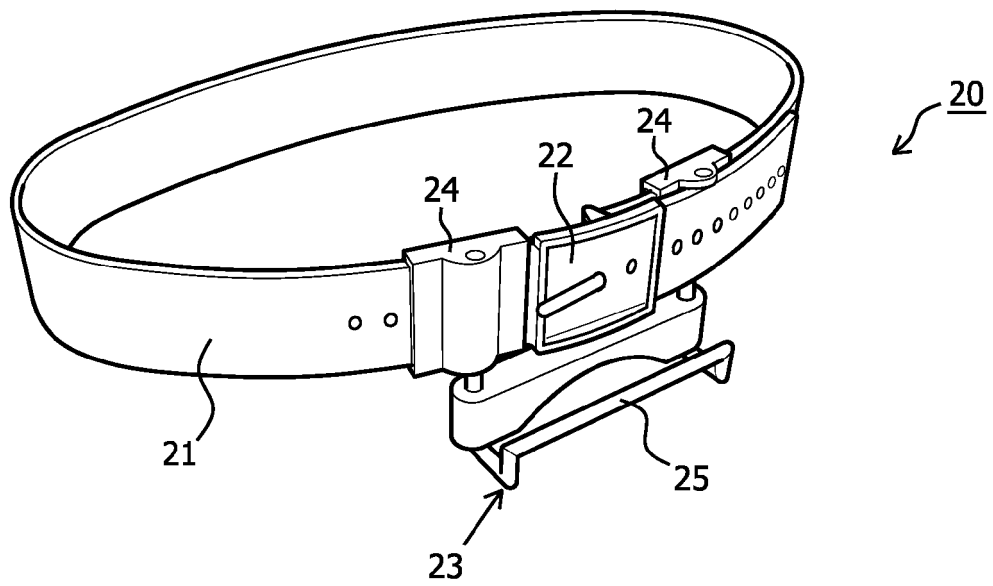


FIG. 2A

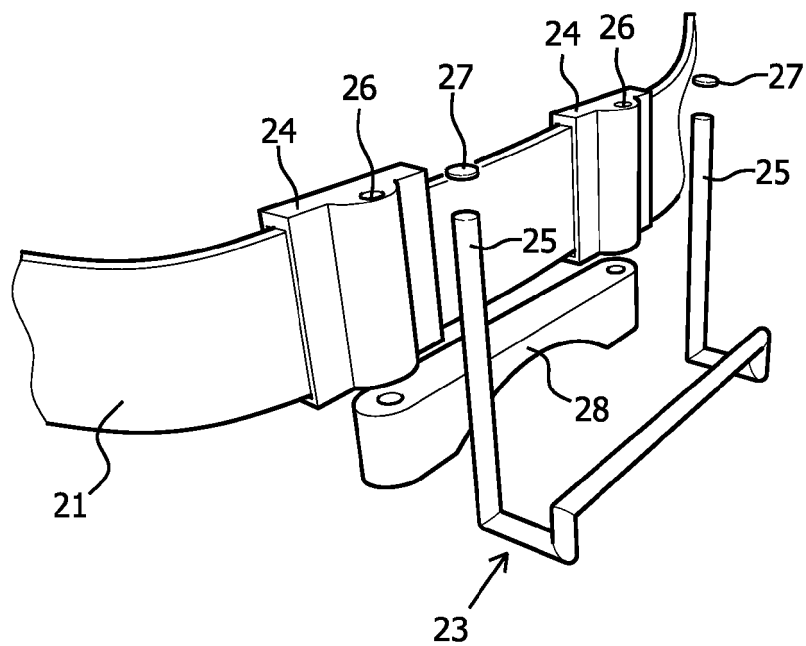


FIG. 2B

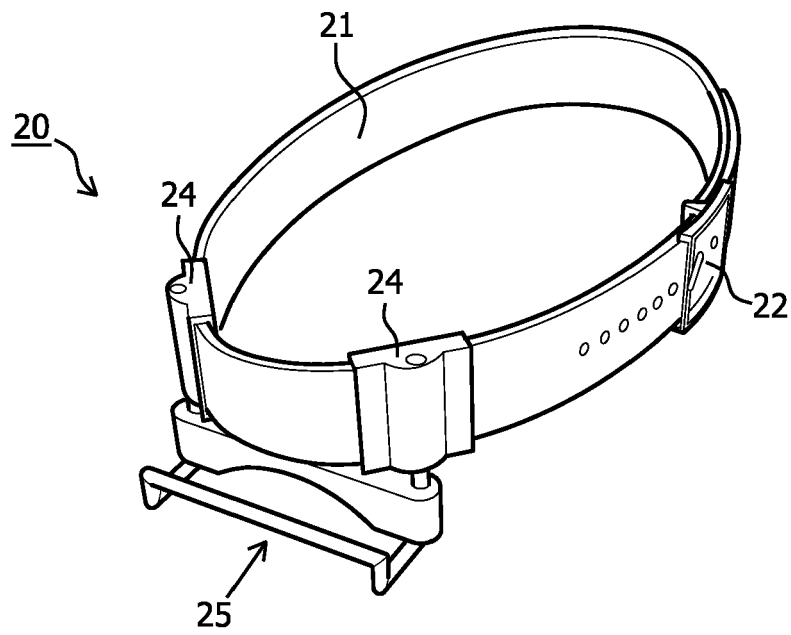


FIG. 2C

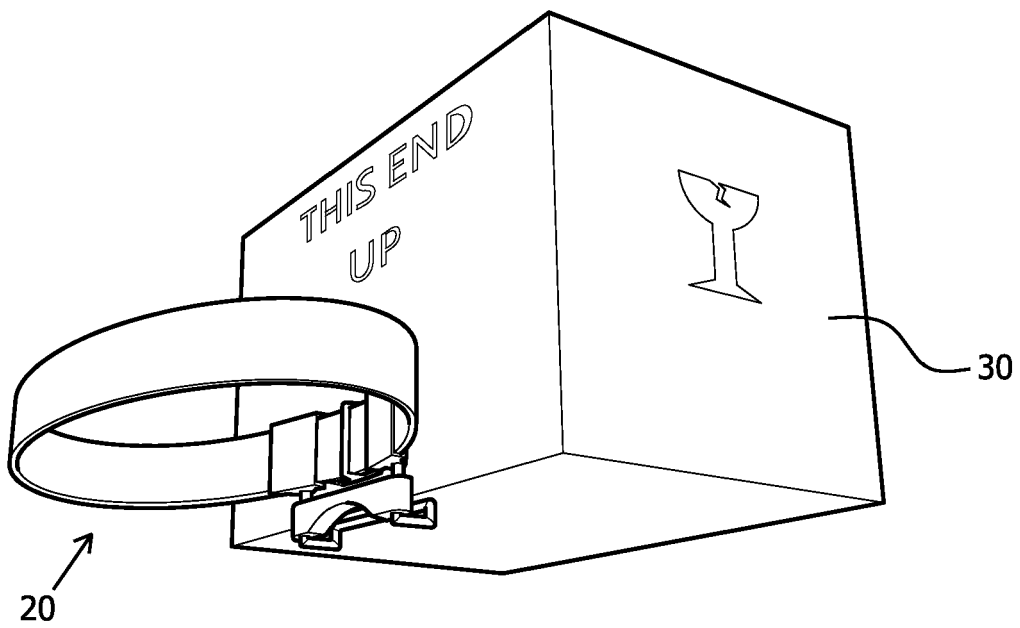


FIG. 2D



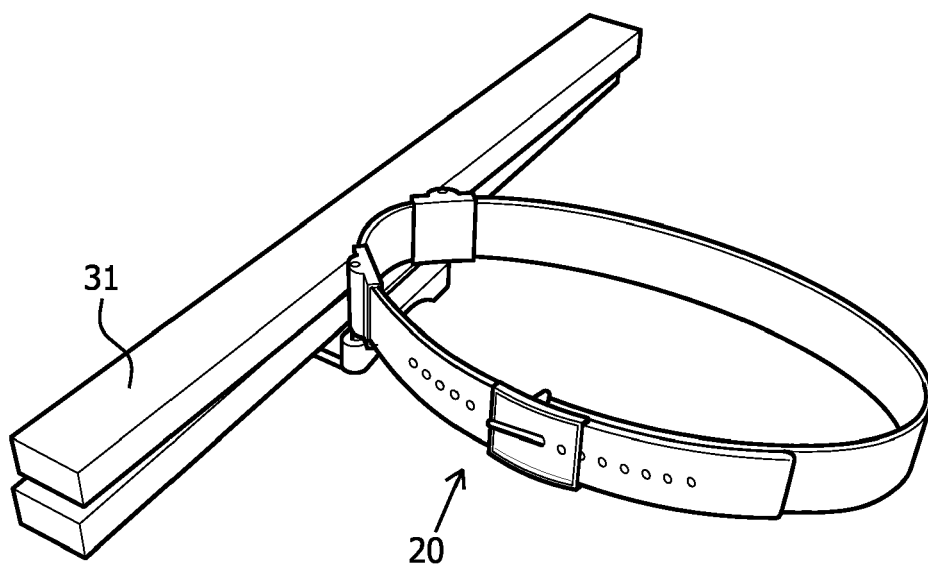
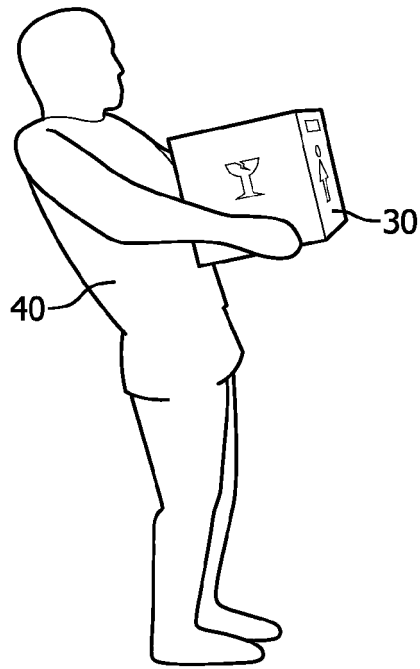
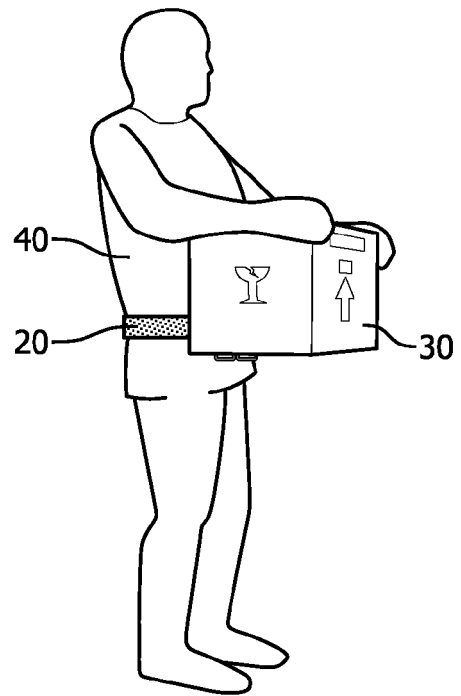


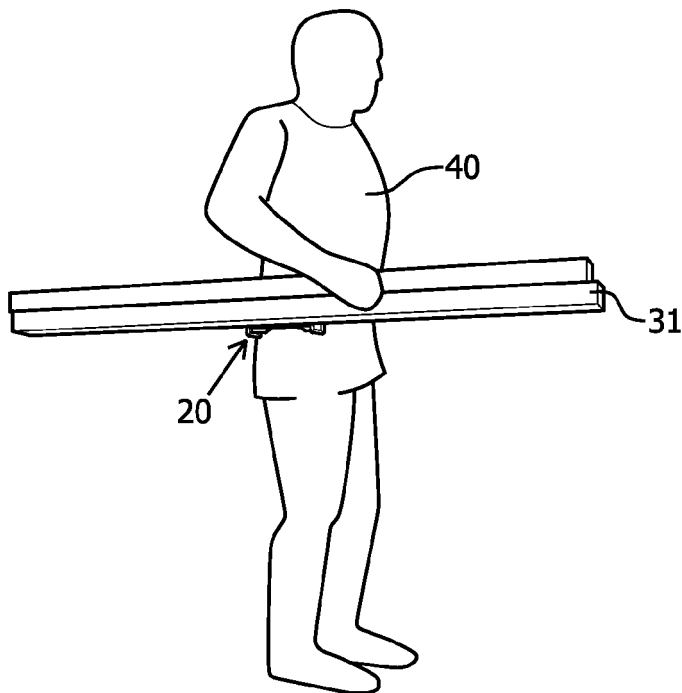
FIG. 2E



**FIG. 3A**



**FIG. 3B**



**FIG. 3C**

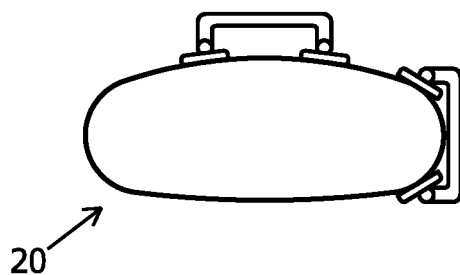


FIG. 4A

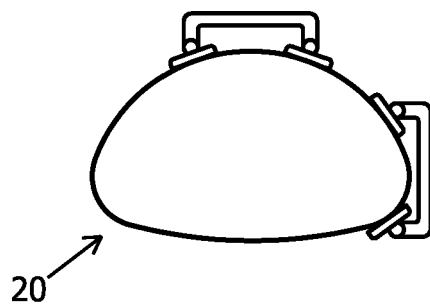


FIG. 4B

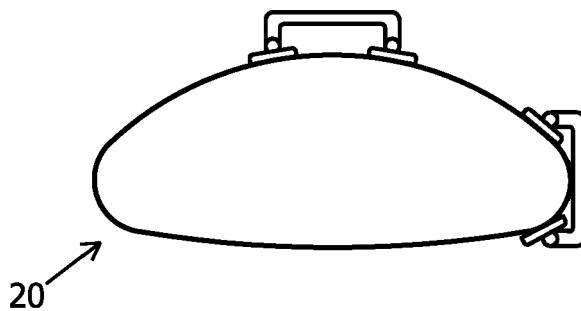


FIG. 4C

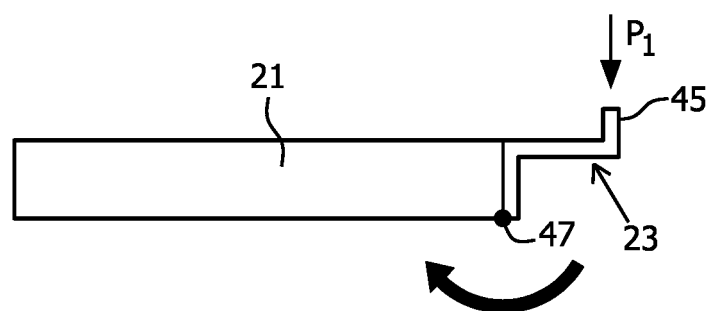


FIG. 5A

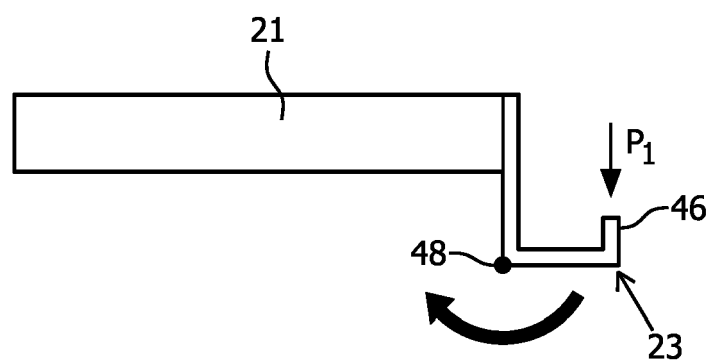


FIG. 5B



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 15 1715

| 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                                                                                                                                                                                                                                                      | NL 1 021 311 C2 (KAREL FRANCKE [NL]; KERSSIES GEERT [NL])<br>24 February 2004 (2004-02-24)<br>* page 5, line 8 - page 6, line 27 *<br>* figures *<br>-----                                                            | 1-9,<br>11-15                                                                                                                                                                                                                                                                         | INV.<br>A45F3/14                               |
| X                                                                                                                                                                                                                                                      | US 2007/017945 A1 (WILLIS JOHN A [US])<br>25 January 2007 (2007-01-25)<br>* figures *<br>* paragraphs [0006], [0016], [0017], [0018], [0019] *<br>-----                                                               | 1-9,<br>12-15                                                                                                                                                                                                                                                                         |                                                |
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| A                                                                                                                                                                                                                                                      | US 2005/161479 A1 (LICSKO ADAM [US])<br>28 July 2005 (2005-07-28)<br>* paragraphs [0024], [0025], [0027], [0028], [0029] *<br>* figures *<br>-----                                                                    | 1-5,12                                                                                                                                                                                                                                                                                | TECHNICAL FIELDS<br>SEARCHED (IPC)<br><br>A45F |
| A                                                                                                                                                                                                                                                      | CA 2 575 128 A1 (LEPAGE JEREMIE [CA])<br>18 May 2007 (2007-05-18)<br>* page 5, paragraph 1 - page 6, paragraph 1 *<br>* page 6, last paragraph *<br>* figures *<br>-----                                              | 15                                                                                                                                                                                                                                                                                    |                                                |
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| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                       |                                                |
| Place of search<br><b>The Hague</b>                                                                                                                                                                                                                    |                                                                                                                                                                                                                       | Date of completion of the search<br><b>19 July 2010</b>                                                                                                                                                                                                                               | Examiner<br><b>van Overbeek, Kajsa</b>         |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                                                                                                       | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding document |                                                |

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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**REFERENCES CITED IN THE DESCRIPTION**

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