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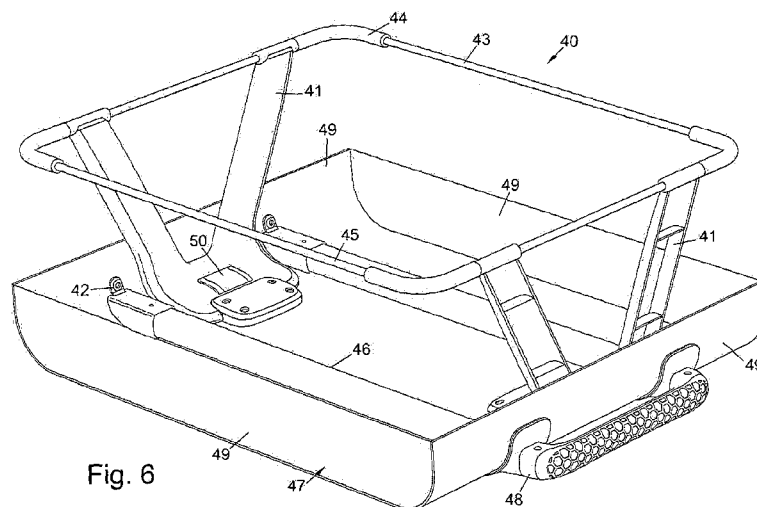


Fig. 6

(57) Abstract: An expandable travelling case comprises a back panel, a flexible jacket, and an expansion mechanism which comprises an expansion arm and a holding frame. The case can be expanded by moving the expansion arm to an expanded configuration. The expanded configuration involves the expansion arm bracing or pushing the holding frame against the flexible jacket in cooperation with the back panel (of the case). The expansion arm is therefore compressed between the jacket and the back panel in the expanded configuration. This provides a tension fit for the flexible jacket.

A CASE

The present invention relates to a case. In particular, the present invention relates to a travelling case, bag or suitcase that is expandable, i.e. it can be expanded to carry
5 larger contents or additional contents.

Expandable travelling cases or bags are known in the prior art. They allow a user to expand the case in one or more dimension of the case for carrying his/her belongings, or to carry larger or additional belongings compared to those that can be carried in the
10 case in an unexpanded configuration. Typical travelling items range from clothes to laptops, and include other accessories of various types.

Although expandable travelling cases nowadays are very popular with consumers, disadvantages can still be identified in the prior art.

Some expandable travelling cases simply use an additional zipped pocket or compartment that can be unzipped and folded out when necessary. However, it is difficult to use the maximum space that can be so gained, since the folded out pocket or compartment can collapse on itself. A large amount of additional items can be stored
20 in these pockets or compartments such that internal pressure is applied to stretch the pockets/compartments to their maximum volume. However, when fully loaded, these expandable cases can result in an unpredictable shape or profile that is not only unsightly, but it can also cause problems where the expanded cases need to fall within predetermined maximum dimensions (this happens, for example, when a case needs
25 to be stored in overhead storage compartments in airplanes).

Other types of expandable cases are known from the prior art. There are some which use complex or bulky expansion mechanisms comprising the likes of expansion frames, levers or arms. Some of these cases can obviate, at least partially, some of the
30 problems associated with foldable zipped compartments or pockets. However, consumers may have to pay comparatively large premiums to purchase expandable travelling cases equipped with such complicated expansion devices.

It is also possible to find on the market relatively inexpensive expandable cases, although these cases typically have less robust or at least less practical expansion systems.

- 5 Certain consumers find expandable cases less aesthetically attractive than equivalent non-expandable cases, due to the presence of unsightly internal or external expansion features such as zips or mechanical arms or the like.

- 10 A further problem arises with the prior art cases, and that is that even in their collapsed state, the case is still of a substantial size, whereby the degree of expansion is only, perhaps, an increase in 25% of capacity, and, further, the storage of the case, when not in use, is still highly space dependant.

- 15 It would therefore be desirable to mitigate or obviate at least one of the above-discussed problems or disadvantages.

It would also be desirable to provide an expandable travelling case which is more practical or simple to use compared to the prior art.

- 20 It would also be desirable to provide an expandable travelling case which is relatively inexpensive to produce, while still being practical, reliable, simple and/or quick to expand.

- 25 Finally, it would be desirable to provide a new concept of expandable travelling case, in which expansion is performed in an alternative manner, or according to a different principle or mechanical mechanism compared to the prior art.

- 30 According to the present invention, there is provided an expandable travelling case, comprising: a back panel; a flexible jacket or skirt; and an expansion mechanism comprising an expansion arm and a holding frame, wherein the case can be expanded by moving the expansion arm to an expanded configuration. In the expanded configuration, the expansion arm braces the holding frame against the flexible jacket or skirt. The expansion arm rests on, or is supported in cooperation with, the back panel of the case, so that the expansion arm can support the holding frame and apply a force
35 against it. The force is ultimately transmitted to the flexible jacket or skirt, whereby at

least a part of the flexible jacket or skirt is put under tension over the holding frame. This arrangement provides for a tension fit of the flexible jacket or skirt over the holding frame in the expanded configuration. The tension fit maximises the internal volume of the case for carrying contents such as clothes or personal belongings.

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Alternatively, according to another aspect of the invention, there is provided an expandable travelling case comprising: a back panel; a flexible skirt or jacket; and at least one tensioner, wherein the case can be expanded by moving the tensioner to an expansion configuration, the expanded case comprising the tensioner exerting a force on the flexible skirt or jacket in cooperation with the back panel of the case, to provide a tension fit for the flexible skirt or jacket.

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Preferably, the case comprises an expansion mechanism comprising the at least one tensioner and a holding frame, wherein the case can be expanded by moving the tensioner to an expansion configuration, the expanded case comprising the tensioner bracing the holding frame against the flexible jacket or skirt in cooperation with the back portion of the case, to provide a tension fit for the flexible jacket or skirt.

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Preferably, at least one tensioner is an expansion arm.

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The use of this expansion system also allows very significant capacity changes for the case - perhaps as much as fourfold the capacity of the collapsed case.

Further, the collapsed case is much less space dependant during storage, the collapsed case being so much thinner than the enlarged case. The collapsed case can have an overall depth down to 75mm.

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Preferably, the expanded case can also be collapsed to a store-away configuration by moving the expansion arm to a folded configuration. The folded configuration can be characterised by the expansion arm laying generally parallel with respect to the back panel, in order to reduce the height or depth, or other dimension, of the case.

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In preferred embodiments of the invention, the flexible jacket or skirt is made of a flexible fabric, such as a flexible synthetic fabric or cloth.

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In some embodiments, the flexible jacket or skirt is made of an elastic or stretchable fabric or cloth that can recover its original shape after it has been stretched out in the expanded configuration.

- 5 Preferably, the holding frame comprises rods, bars or elongated segments of a structural material, all of which are particularly well suited for keeping the flexible jacket or skirt in tension thereover.

- 10 Preferably, said rods or elongated segments form a network or frame of elongated segments (such as a web structure) over which the jacket can be put in tension when the travelling bag is expanded.

- 15 On certain locations, such as corners or joints, the holding frame may be subjected to high loads. Certain embodiments, therefore, can comprise reinforced segments or portions, such as thickened rods or bars, or reinforced corners, or reinforced hinge-points.

- 20 Preferably, the holding frame is made of an aramid, graphite, carbon or glass fibre material. These can have an ideal balance between strength and lightness for these applications. It can also be, instead, steel, aluminium or a titanium or magnesium alloy or a polymer.

- 25 In preferred embodiments, the back panel is generally rectangular, in order to give the expandable travelling case a generally rectangular profile or projection, which is particularly practical, common and popular among consumers.

- 30 Preferably, the back panel comprises a plastics sheet. The plastics sheet can be a polyethylene sheet, which is light and yet durable and resistant. Polyethylene is also a standard material used for this part in the industry, thus it is easy to source and manufacture in the required shape. It might alternatively be aluminium or a polycarbonate. Other known materials used in the art might likewise be used.

- 35 In some embodiments, the back panel has an internally concave shape, in which any expansion arm can fold. The flexible jacket or skirt could also be stored in the concave back panel in the collapsed, unexpanded configuration of the case.

Some preferred embodiments will be equipped with a holding frame having substantially the same outer shape, i.e. overall width and length, of the back panel. Such a shape can be rectangular or square, for example.

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In some particularly advantageous embodiments, the holding frame will be arranged such that it maintains a generally parallel and overlapping spatial relationship with the back panel both in the expanded and unexpanded configurations. This allows the case to be re-configured in a compact manner.

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In addition, in some embodiments, the back panel may be internally concave, with sides projecting out of the main plane of the back panel, and the holding frame can be configured for resting on the back panel, inside its sides, when the case is collapsed, so that the holding frame is hidden away in the collapsed configuration.

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If the back panel and the holding frame have a substantially matching shape and substantially matching overall width and length, these two elements can also be arranged so as to have a substantially corresponding projection, with the projection being projected according to a generally out-of-plane direction, such as a generally perpendicular dimension with respect to the back panel and the frame.

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In preferred embodiments, the holding frame comprises perimeter bars, rods or the like, which can be reinforced at any corner (the corners are particularly susceptible of bearing the tension created in the flexible jacket). Any reinforced corners can be made of injection moulded polypropylene, polycarbonate, PVC, polyethylene or other materials used for a similar purpose in the art.

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Preferably, there will be two expansion arms. They may be located in correspondence of opposite sides or ends of the expandable case, i.e. they can be symmetrically arranged relative to one another.

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Preferably, the expansion arm(s) will each have a back and a front end, the back end being located generally closer to, or designed for interacting with, the back panel of the case, and the front end being located generally closer to, or designed for interaction or

connection with, the holding frame of the case - the front end is therefore directly used for implementing the expansion of the case in cooperation with the holding frame.

5 The front end(s) of the expansion arm(s) may be pivotally connected to the holding frame, so that expanding and collapsing the case can be performed by rotating the arm(s) around the pivotal connection(s) between the holding frame and the arm(s). The extension/expansion arm(s) can therefore swing around the pivotal connection(s) so that they can be configured substantially parallel to the back panel, or generally out-of-plane with respect to the back panel. The former, parallel configuration corresponds to
10 a collapsed configuration of the case, and the latter, out-of-plane configuration corresponds to an expanded configuration of the case.

To provide stability to the case in the expanded configuration, the back panel can be equipped with one or more inner retention means to hold the back end(s) of the
15 expansion arm(s) on the back panel while tension is applied by the expansion arm(s) to the flexible jacket via the holding frame. Preferably, the retention means comprise locking means, so that the expansion arm(s) can be locked, if required, in the required position on the back panel.

20 Preferably, one or more of the inner locking means comprises respective one or more locking plates. Each locking plate may be screwed on the back panel. Each locking plate may comprise a locking recess, so that a corresponding expansion arm can be locked in place relative to the back panel in the expanded configuration of the case by engaging the back end of the arm with said recess.

25 Preferably, a perpendicular projection of at least one of the retention or locking means falls within the projection of the holding frame. This is so that it is possible for the corresponding expansion arm(s) to swing inwardly with respect of the back panel under the tension force of the jacket. With this arrangement, should any expansion arm(s) or
30 any corresponding retention or locking means fail, the expansion arm(s) would end up safely folded inside the case.

Preferably, the extension arm(s) are equipped with pulling tab(s), so that the tab(s) can be pulled out of the corresponding retention means (or locking means, such as a

recess). In some embodiments, the pulling tab(s) are made with webbing material, which is particularly strong and suitable for being pulled.

5 Preferably, the flexible jacket surrounds or encapsulates a rigid back panel, and is located substantially all around the case.

Alternatively, the flexible jacket might be connected to a rigid back panel in a different manner, along the perimeter or edge of the rigid back panel.

10 The above two jacket (or skirt) arrangements provide for a case comprising a rigid base portion (given by the rigid back panel), and for a flexible or semi-rigid expandable portion (flexible in the collapsed configuration, and semi-rigid in the expanded configuration, where the jacket - or skirt - is under tension).

15 In one embodiment, the collapsed case comprises the or an expansion arm laying generally parallel with respect to the holding frame.

In some embodiments, the expansion arm(s) in the expanded configuration is/are in generally out-of-plane geometrical relation with respect to the back panel.

20 It is also a possibility to have any of the expansion arms in the expanded configuration in generally out-of-plane geometrical relation with respect to the holding frame.

In embodiments with two expansion arms, the two expansion arms can be conveniently symmetrically positioned with respect to a median plane of the travelling case.

25 The flexible jacket or skirt can surround substantially all of the case, and can also be arranged as a tight fit on at least a side of the back panel. This arrangement is especially advantageous with a rigid back panel. As a skirt, however, it might not extend around the sides of the case. It might instead be joined at an edge to front and back panels. The joint may be with a zip to facilitate opening of the case.

30 The jacket or skirt might have a zip provided elsewhere on it – e.g. around the sides – usually 3 sides – of the case, also to facilitate the opening of the case.

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The travelling case can comprise a length, a width and a depth, and the expansion mechanism may be configured for expanding the depth of the case. When that is the case, the holding frame and the back panel can have substantially matching projections, the projections being taken in the direction of the depth of the case.

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Preferably, the back panel and the holding frame are configured for maintaining, relatively to each other, a generally parallel geometric relation in both the expanded and unexpanded configurations of the case.

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Preferably, each expansion arm is configured for folding inwardly with respect to the back panel, and/or the holding frame.

Preferably, the or each tensioner are located internally of an internal volume defined by the case.

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Preferably, the flexible skirt or jacket is configured to fold on or over the back panel.

Preferably, the flexible skirt or jacket comprises fold lines, to help with the folding of the skirt or jacket when the case is re-configured in the store-away configuration.

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Preferably, the or each tensioner is pivotally attached to the flexible skirt or jacket, so that deployment and retraction are facilitated.

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Preferably, the or each tensioner is a tensioning panel. The panel can be made of any suitable rigid or semirigid material capable of withstanding the required tensioning forces. Honeycomb structures can be adequate for such panels.

Preferably, the or each tensioning panel extends along a side of the case.

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Preferably, each tensioning panel extends substantially over the length of the case in the expanded or unexpanded configurations of the case, and extends substantially over the depth of the case in the expanded configuration of the case. This is a preferred configuration because the encumbrance of the expansion system is minimised, while the tensioning forces are conveniently applied.

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Preferably, two corresponding parts of a retention means are mounted respectively one on the back panel and the other on one of the tensioning panels.

Preferably, two opposed reinforcement panels or strips extend across the width of the case on opposing sides, said reinforcement panels being deployable for reinforcement when the case is expanded. This improves the strength of the case in its expanded configuration.

Preferably, the reinforcement panels can be retracted or folded away when the case is collapsed to a store-away configuration.

Preferably, at least one of the reinforcement panels or strips is locked into its deployed configuration by at least one of the tensioning panels when the case is expanded. This avoids the need of retention or locking means for the reinforcement plates.

Preferably, a top cover is provided which can be operated by a user to open and access the case, or to close the case and prevent access thereto.

Preferably, the top cover is hingedly attached to the flexible skirt or jacket.

These and other features of the present invention will now be described, purely by way of example, with reference to the accompanying drawings in which:

Figure 1 is a front perspective view of an expansion arm with corresponding inner and outer locking plates and corresponding set of four screws according to an embodiment of the present invention;

Figure 2 is a back perspective view of the components of Figure 1;

Figure 3 is a top perspective view of an assembly comprising a back panel, an expansion mechanism and a trolley handle according to an embodiment of the present invention;

Figure 4 is a top plan view of the assembly of Figure 3;

Figure 5 is a bottom perspective view of the expansion mechanism of Figures 3 and 4;

Figure 6 is a top perspective representation of an expandable travelling case according to the present invention with missing flexible jacket, in an expanded configuration;

Figure 7 is a side perspective view of an expanded travelling case according to the present invention;

Figure 8 is a representation of the travelling case of Figure 7 with missing cover jacket;

Figure 9 is a representation of the mechanism for collapsing a travelling case in accordance with the present invention;

Figure 10 shows a travelling case according to the present invention with expansion arms unlocked and about to be folded;

Figure 11 shows a travelling case according to an embodiment of the present invention with retracted or folded expansion arms, in partially collapsed configuration;

Figure 12 illustrates a volume gain according to an expandable travelling case in accordance with the present invention, with dimensions given in mm;

Figure 13 shows a travelling case in accordance with the present invention in fully collapsed configuration with dimensions given in mm; and

Figure 14 shows the internal configuration of the expansion arms of the collapsed travelling case of Figure 13.

Figures 15 to 71 show an alternative embodiment of the invention, and its operation, relating to expandable luggage particularly suitable as checked-in luggage.

Referring to Figure 1, there is illustrated an expansion arm 1 for use in an expandable travelling bag according to the present invention. The arm 1 has a top and a bottom, or a front and a back, ends 11, 12 which are configured for interacting, respectively, with a holding frame and with a base panel, or back panel, of the case. In particular, the back

end or base 12 of the arm 1 is configured for connection to a base plate, and the front end 11 is configured for supporting a holding frame over which a flexible fabric or cloth can be stretched, or put under tension, to form a tension fit which expands the expandable case. The tension fit is created by the expansion arm 1 being configured substantially vertically between the base panel and the jacket; in this configuration the jacket is subjected to tension. The jacket is either connected to the base panel of the case, or lines it from the outside, so that when the arm pushes against the back panel of the case, the tension fit can be formed in the jacket.

The arm, or arms if there is more than one, can be said to be "sandwiched" between the base and the jacket, i.e. subjected to compression while the jacket is in tension. The arm or arms can then be reconfigured substantially horizontally with respect to the base or holding frame to remove the tension in the fabric jacket. Thus, the case can be collapsed by folding away or collapsing the jacket once the tension has been removed therefrom.

Further features of the tension fit will be described in more detail below.

The expansion arm 1 of Figure 1 has a "V" or "Y" shape, characterised by the presence of a bifurcation or branching, but alternative shapes would be possible, including a substantially straight shape, with no branching. The bifurcation shown in Figures 1 and 2 serves to provide extra mechanical strength to the expandable case. Furthermore, it provides additional separate supports for the holding frame for hoisting the jacket in tension, as will be apparent later.

At the top end 11 of the expansion arm 1, two hollow cylinders 13 are integrally formed therewith. These cylinders work as bushings, and are capable of accepting a wire-frame type element (or pin or rod) thereinside, so that a hinge can be formed, around which the expansion arm can swing. Such wire-frame element or pin is usually a part of the holding frame.

The inner part of the arm 1 (with reference to its "in use" configuration) is smooth and pleasant to the sight and touch - this is the side of the arm shown in Figure 1. The back part of the arm can instead be used to provide reinforcement, as this part would not be visible to the user when the case is opened - this side is seen from Figure 2. The back

side of the arm 1 of Figure 2 has reinforcements in the shape of ribs or transversal elements 6 which provide the arm 1 with the required rigidity - after all it is important that the arm 1 is mechanically strong, as it has to support the compression load transmitted from the jacket. The expansion arm 1 also has a base portion 4, which is substantially at right angles with the bifurcated portion of the arm. This portion 4 is at the back end 12 of the arm 1.

When the arm 1 is configured vertically, inside the case, it holds a holding frame against a flexible jacket to expand the case - this will be described in more detail below.

The base portion 4 is responsible, under these conditions, for connecting and resting on the back panel, so that a reaction force can be transmitted from the panel, against which the arm 1 is supported, to the flexible jacket. In particular, such base portion 4 is equipped with a recess 9 that is sized to engage with a protruding element or head or a support plate 5 which is fixed on the back panel, inside the case. The arm 1 - which can rotate around the hinges formed by the cylinders 13 and the holding frame - is thus prevented from rotating inwardly of the case, so that the vertical portion 11 of the arm 1 is supported firmly, so that the flexible jacket can also be supported in the expanded configuration of the case.

The base support plate 5, or internal protruding element 5, in this embodiment is simply screwed on to the back panel by four screws 3 that connect the inside plate with an external element or back plate provided on the back of the panel. The back plate 7 has screw holes in correspondence of holes formed on the base plate 5. Corresponding screw holes are formed in the back panel of the case. A method of forming them is punching, which requires the back panel of the case being made of a punchable material, such as polyethylene sheet.

Figure 3 shows the "skeleton" of the expandable case. This is an assembly comprising expansion arms 21 of the kind described above (shown in Figure 3 in an "engaged" or expanded configuration), a back panel 25 and a holding frame 23. In Figure 3, the expansion arms 21 are retained and locked on the back panel 25 by protruding base plates 28.

The retention and engagement is performed via a recess formed on the back end of each arm 21. Each recess interlocks with the profile of the corresponding base plate 28.

- 5 Each base plate 28 may additionally have an upper lip 8 (shown in Figure 2) which prevents the arm 21 from accidentally disengaging from its retention plate.

To disengage the arm from the base plate, the user is required to pull the arm 21 backwards, towards a side of the case, and up, against the tensile force of the jacket,
10 before he can swing the arm 21 inwards, thereby removing the jacket's tension.

The assembly of Figure 3 does not show the jacket, or skirt, forming the tensile fit of the case (a jacket, a skirt, or a combination comprising a jacket and a skirt can be used to provide the tension fit according to different embodiments of the invention).

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As it can be seen in Figures 3 and 4, the two expansion arms 21 support a holding frame 23, over which the jacket is put under tension in the expanded configuration. The expansion arms 21 are located on opposite sides of the case, which in this embodiment are the top and bottom sides of the case. The top side of the bag can be
20 recognised by the presence of a trolley handle in correspondence of that side.

There will also be a corresponding internal sleeve or casing 27 for the trolley's handle.

The holding frame is rectangular, and made of a wire-form structural material, in this
25 case fibre glass rods 31. The holding frame comprises four rods 31, connected at right angles with corner units 30 made of injection moulded polypropylene. The rods are inserted into holes formed on the ends of said corner units 30. However, the holding frame could also be integrally formed from the same material.

30 There will be multiple methods of manufacture possible for such as structure, as it known in the art.

The corner units 30 in this embodiment are notably thicker than the fibre glass rods. This provides for additional resistance at those corners 30.

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Figure 4 represents the assembly of Figure 4 from in top plan view. The expansion arms 21 and the holding frame 23 form the expansion mechanism 29 for the expandable case. It can also be observed that the housing for the trolley handle is used to form the internal concave shape of the internal polyethylene board sheet (the back panel 25) in correspondence of the top of the case.

Figure 5 shows the expansion mechanism 29 of Figures 3 and 4 from a different angle. The various elements previously described are readily identifiable, such as the rods 31 forming the holding frame 23, the corner units 30, the expansion arms 21 and the inner and outer plate assemblies 28, which are formed by inner and outer plates and by connecting screws as illustrated in Figures 1 and 2.

At the back of one of the expansion arms 21 in Figure 5, a cut portion 37 can also be seen. This is used to house a pulling tab (not shown) for the expansion arm. Such a pulling tab is made of webbing cloth. It is by means of such pulling tabs that the user can easily disengage the base portion of the expansion arms 21 from the retaining plates, by pulling the pulling tabs gently backward, towards the side of the case, and then upwards to overcome the upper lip 8 formed on the base plate 5. Each pulling tab passes through the cut portion 37, and is retained therebetween at least in one direction.

Figure 6 shows an alternative embodiment of a travelling case 40 in accordance with the present invention (without showing a flexible jacket or cover) - this embodiment is similar compared to the embodiments described so far. The base of the case 40 is an internally concave back panel 47. The panel has a flat base, and four sides 49. These give the case 40 its overall dimensions lengthwise and widthwise.

The back panel 47 is provided with a housing 46, on the internal side, for accommodating a trolley-style handle 48. Notably, the housing runs across the whole length of the back panel 47, and is supported in connection with the top and bottom sides of the back panel. The attachment is by means of screws 42. The housing 46 provides the case 40 with additional rigidity across its length, and the shape and profile of the housing's top and bottom ends contributes to forming and maintaining the curvature of the top and bottom sides of the back panel 47.

The expansion arms 41 are illustrated in the expanded configuration, with the back end portions of the arms 41 firmly engaged against the back plate assemblies 49. The bifurcated ends of the expansion arms 41 rise vertically, out of the plane of the back panel 47, and hold a holding frame 45 in expanded configuration.

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As described above, the holding frame 45 comprises rods and corner units 44, and has a generally rectangular shape, generally matching the shape of the back panel 47. The resulting shape of the case 40 will be generally prismatic, with a rectangular base given by the back panel 47. The height or depth of the expanded case is determined basically by the length or height of the expansion arms, and the depth/height of the collapsed case is determined by the height of the sides of the concave back panel 47, as the expansion mechanism is folded and accommodated on the back panel 47.

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The holding frame 45 is maintained parallel to the back panel 47 in the expanded or collapsed configurations of the case 40.

Figure 7 represents a complete expandable travelling case 60. The case is represented in the expanded configuration, and the outer jacket 61 is visible. The case is a travelling trolley with telescopic handle 62 and castors 67.

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Figure 8 shows the case 60 without the tension jacket 61. Features of the expansion case 60 can then be identified, such as the back panel 63, the holding frame 64, the expansion arms 65 and the retention base plates or protrusions 66.

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Figure 9 illustrates schematically the mechanism 70 for collapsing the case 79; the pulling tabs 77 are used to pull the expansion arms 71 out from their retained or locked configuration, and are then folded upwardly and inwardly of the case 79 (see the arrows) until they substantially align with the holding frame 72. At that point, the jacket is no longer in tension, and it is free to collapse on its sides 74. It is clear from this

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Figure that a flexible skirt 74 could be used instead of a flexible jacket. Therefore, the upper part of the case 79 could also be made of a non-flexible material, with the part forming the tension fit of the case 79 being just the skirt 74 all around the case 79.

In Figure 9, the base plates 76 can also be identified, they extend through the back base 75 of the case 79, and are therefore also useful to keep the case 79 raised from the ground, when the case is laid flat as in Figure 9.

5 In this embodiment, the holding frame 72 is simply pushed against the jacket 74, but not otherwise connected thereto. Alternatively, the jacket 74 can be fixed or connected in a known manner to the holding frame 72, for example by forming pockets inside the jacket 74, that can house the wire-form elements of the holding frame 72.

10 The disengagement of the expansion arms from their retention means 76 on the back panel is better represented in Figure 10, while Figure 11 shows the expansion arms 71 in nearly fully retracted configuration - they have rotated about 70 degrees relative to the vertical direction (roughly, the one shown in Figure 10). Figure 11 also shows schematically that the sides of the jacket 74 have started to collapse, since they
15 present wrinkles.

Figures 12, 13 and 14 illustrate dimensional details of a preferred embodiment. They all show the case from a side, while the case lies horizontally on its back side 75. Other cases, however, are anticipated, such as carry-on cases, briefcases, medium
20 suitcases, large suitcases and trunks. They would have dimensions corresponding to industry standards.

Figure 12 shows the maximum expansion of the case with reference to the collapsed configuration. As it can be seen, the depth of the case roughly triples in the expanded
25 configuration. It is foreseeable that the depth of the case 79 could also quadruple with the expansion mechanism of the present invention. Triplification of the depth would correspond to roughly a 200% gain in storage space.

Figure 13 shows that the collapsed case is particularly shallow and easy to store away,
30 with a maximum depth in this embodiment, amounting to only 81mm. The maximum length of the case is instead 524mm, as measured from the end of the handle (retracted) to the castors 96. It should be noted that in the collapsed configuration of the case the expansion mechanism 70 "disappears" inside the concave back panel 75, and that the plane of the rectangular holding frame 72 is substantially flush with the
35 plane identified by the edges of the sides of the back panel 75, as shown in Figure 14.

Figure 14 illustrates that the profile of the expansion arms 71 forms a truncated triangle, or a notional triangle, when the ends of the expansion arms are connected with an imaginary line (that line overlaps with the profile of the holding frame 72 in Figure 14). The vertical height of that triangle corresponds substantially with the depth of the collapsed case 79, and this ensures that the expansion arms tidily and neatly stow inside the concave back panel 75 when they are folded while the holding frame is also snugly housed inside the concave back panel.

Figures 15 to 71 illustrate another embodiment of the invention. Figures 15 to 71 are accompanied by text which is part of this disclosure. The embodiment illustrated by Figures 15 to 71 relates to luggage that is suitable for use as checked-in luggage, although the principle are applicable in other luggage forms.

In its fully expanded configuration, as shown in Figure 15 and 16, the case is a generally rigid case. Some parts of the case are rigid, such as the back panel 140 and the cover lid 150. The case's skirt 130 is instead flexible, and is put in tension by the expansion system. The skirt 130 of the tensioning system is flexible because its function is to expand the case when required. The skirt 130 cooperates with reinforcement members that make the case substantially rigid when expanded. These reinforcement members are the inside tensioning panels 110 and the reinforcing panels 120.

The overall appearance of the case 100 from outside is that of a generally rigid case, although it is expanded due to the presence of a flexible skirt 130 that is put under tension when the case is expanded.

Perspective views of the expanded and collapsed configurations of the case 100 are provided in Figure 32.

Figure 50 shows the tension applied to the fabric skirt 130 by the side panels 110.

The side panels 110 can rotate around a webbing hinge 180 provided on the skirt 130, between the skirt 130 and the tensioning panels 110. Rotation of the side tensioning panels 110 determines the expansion of the case. The four internal locks 160, 170

secure the inner side panels 110 which in turn keep the reinforcing strips 120 in place when the case 100 is expanded.

5 The lock buttons of the internal locks can be pushed to release the tensioning panels 110. The panels can then be fully rotated up until they are generally parallel with the back panel 140 of the case 100. The case 100 thus loses its structure and is ready to become flat.

10 The lid 150 is also rigid, like the back panel 140. It can be zipped around the case 100. In particular, in this embodiment, the lid 150 is zipped all around the flexible skirt 130.

Figures 26 to 28, 51 to 58 and 65 to 71 show in detail the construction and functioning of the retaining means of the case.

15 Figures 59 to 64 show the principle of operation of the expandable case, with the soft fabric wall 130 that can collapse once the tension applied thereto by the side tensioning panels 110 is removed by undoing the retention means 160, 170.

20 Further statements about the modes of use and operation of the case of this alternative embodiment are provided in the drawings, the content of which is incorporated herein by way of this reference thereto. Dimensions, materials, properties and features not included in claim 1 are preferred but optional, and are given by way of example only.

25 The present invention therefore achieves a number of advantages – easy use, small stowage footprint, large expanded capacity and desirable external appearance.

The present invention has been described above purely by way of example. Modifications in detail may be made to the invention within the scope of the claims appended hereto.

Text from figures:

Figure	Ref. sign	Text
17	190 196	# 30mm internal honeycomb strips - locked by the side panels The 21" trolley can be no more than 200 deep when fully loaded
19	191	the structure of the sides of the case is made by our internal locking panels
20	192 193	TOP and BOTTOM of the LID (are in YELLOW) CAN have PE board support in order to help the panel hold it's shape and create support for the bottom foot. STRONG WHEN USED - Have a fully rigid trolley case (SMALL , MEDIUM AND LARGE) - the case (especially medium and large sizes) withstands various impacts and shocks without losing shape or structure - the internal panels , locking parts and internal honeycomb are strong COMPACT All three sizes become as FLAT as possible when internal components are UNLOCKED. We estimate that ALL sizes can be collapsed to 75mm thickness LIGHT - 3 : All cases remain as lightweight as possible but front panels also to look good. (avoid sagging , avoid creases) . Avoid piping but use thin internal support when needed to keep a nice shape. EASY TO OPEN/CLOSE - 4 : The front panel of the case is EASY to open (#10 zip) . Easy to open the zip in all curved parts pf the lid panel
21	194	The rear side panels can have thin PE board with soft backing (facing OUT)
22	195	side panels LOCK the top and bottom the #30mm honeycomb stripes
23	197 198	THE 4 INTERNAL LOCKS SECURE. THE INNER SIDE PANELS AND KEEP THE # 30 MM HONEYCOMB STRIPS IN PLACE > THE CASE (SMALL , MEDIUM AND LARGE) IS VERY RIGID AND STRONG PUSH THE LOCK BUTTON TO UNLOCK THE SIDE PANELS (TOP AND BOTTOM) THE PANELS ARE HINGED AT THE TOP (USE # 40 MM WEBBING HINGE : Rear of PANEL) Panels rotate UP to allow the case to become SOFT : ready to become FLAT !
24	199	Webbing Hinge (at the back)
25	200	PANELS ARE FULLY ROTATED UP The top of the side panels can now collapse inside the case (adjust fold lines on top and sides accordingly to allow the case to fold as flat as possible)
26	201 202	PUSH THE BUTTON TO UNLOCK THE PANELS (2 LOCKS per PANEL) LINING MATERIAL COVERED PANELS (THIN HONEYCOMB) TOP AND BOTTOM LOCKS KEEP THEM IN PLACE TO GUARANTY THE STRUCTURE OF THE CASE LOCKING THE # 30 MM HONEYCOMB STRIPS AT THE TOP AND BOTTOM
27	203	SIDE PANELS ARE UNLOCKED THE PANELS CAN ROTATE UPWARD THE CASE LOSES IT' S STRUCTURE (SIDES) WHEN THE PANELS ARE FULLY UP (90 degree UP) the case is ready to become FLAT
29		1 : UNZIP THE LID

30	204	Unlocked panels are fully rotated (90 degree UP) to unlock the case totally and allow it to lose it's structure > the case can then become flat
	205	The webbing hinge at the top of the side panels is stitched between the rear of the panel and the inner of the main body jacket. The hinge in NOT too wide to allow the case top and side for fold IN as much as possible when the case becomes FLAT .
		THE TOP AND BOTTOM # 30 MM PE BOARD STRIPS ARE NO LONGER LOCKED BY THE SIDE PANELS
31	206	2 : OPEN THE LID
	207	3 : PRESS THE BUTTONS TO UNLOCK THE SIDE PANELS
		TOP AND BOTTOM # 30 mm HONEYCOMB STRIPS ARE LOCKED BY THE SIDE PANELS
32		CARRY ON SIZE - 75 MM FLAT / 200 MM EXPANDED
33	208	The fold lines allow the top , bottom but mainly the sides to fold nicely when the case is put in it's flat state. ADJUST POSITION OF THE FOLD LINES TO HELP FOLDING IF NEEDED
34 & 35	209	The side panels lock the top and bottom honeycomb
36		Interior : FULLY LINED (including side panels)
37	210	honeycomb top and bottom
38	211	The side panels are unlocked and go up > the honeycomb top and bottom are now free to fold IN.
42		INTERNAL SIDE PANELS : THIS IS AN ELEMENT OF THE CASE. The panel has a top hinge (webbing) to allow the rotation when the V-BLOCK locks are unlocked. On small trolley the side panels are thin but rigid enough. Weight saving is VERY important on small trolley. Medium and large trolleys have strong and rigid side panels but the cases remain light Panel for 55 cm trolley lining material covered - clearance corner for the trolley inner housing - clearance corner for the wheels inner housing
42 & 43	212	Top hinge (use 38 mm PP webbing)
43		The side panels + base and top Honeycomb are elements that make the case strong and rigid
46	215	Press the front button to unlock (2 locks per panel)
	216	Pull the webbing loop to rotate the panel UP
47	217	Bottom Honeycomb : locked by side panels
48	218	Top Honeycomb : locked by side panels
49		When side panels are locked down they stop movement of the honeycomb
50	219	the 4 locks keep enough vertical tension on the panels to keep the top edge UP and the case RIGID Side fabric tension
51	220	FRONT screws (x 3)
52	221	RIGHT rotating side panel PE board or thin honeycomb covered with lining material.
53		TOP
54	222	GO logo recess : gloss finish (no texture)
	225	#25 mm beige webbing loop with grey edge
	223	V-block top > textured
	224	V-block base > textured

55	220 226 227	screws (x 3) webbing loop has a hole to secure it it place bottom of the webbing is turned the back rib will press the webbing against the side panel
56	229 228	front button locks the top : no forward movement internal sliders : the top is lined up and secure : no upward or side movement
57	228	internal sliders : the top is lined up and secure : no upward or side movement
58	230	top and base components are very strong as they will be securing the internal side panels when the case is used for travel
59		The foot is locked. Press the button to unlock. Pull the webbingloop at the same time
	231	Luggage soft side wall is in tension thanks to the locks
61	232	soft fabric wall can now collapse down
62	233 234	webbing loop to pull the top when unlocked Button pressed : ready to slide out
63	235	top part slides out of the base when pulling the top webbing
64		top is out of the base and the side panel can rotate freely allowing to make the case flat
65	236	top is locked onto the base (slide sliders)
66	237	front button pushed > rotation can start. top slider can move forward
67	238	top slider fully out > the top is free to move completely
68	239	V-block base internal side sliders
69	240	V-block top internal side sliders
70	241	sliders must side in and out easily (easy positioning) The top and base sliders are shaped to : 1/ avoid movement when locked. 2/ engage and slide easily when the top part is unlocked
71		3D supplied is just to show the looks and functions we want. 1/ All wall thicknesses to be engineered to the correct thickness 2 /Screw position is correct but can be moved a little to improve the components strength. 3/ Top and Base part are strong to withstand various top bottom and side impacts

CLAIMS:

- 1 An expandable travelling case comprising:
a back panel;
5 a flexible skirt or jacket; and
at least one tensioner, wherein the case can be expanded by moving the tensioner to an expansion configuration, the expanded case comprising the tensioner exerting a force on the flexible skirt or jacket in cooperation with the back panel of the case, to provide a tension fit for the flexible skirt or jacket.
- 10 2 An expandable travelling case according to claim 1, further comprising an expansion mechanism comprising the at least one tensioner and a holding frame, wherein the case can be expanded by moving the tensioner to an expansion configuration, the expanded case comprising the tensioner bracing the holding frame
15 against the flexible jacket or skirt in cooperation with the back portion of the case, to provide a tension fit for the flexible jacket or skirt.
- 3 An expandable travelling case according to claim 1 or 2, wherein at least one tensioner is an expansion arm.
- 20 4 An expandable travelling case according to claim 1, 2 or 3, wherein the expanded case can be collapsed to a store-away configuration by moving the tensioner to a folded configuration, thereby slackening tension in the jacket or skirt.
- 25 5 An expandable travelling case according to claim 4, wherein the collapsed case further comprises the tensioner laying generally parallel with respect to the holding frame or to the back panel.
- 30 6 An expandable travelling case according to any one of the preceding claims, wherein the tensioner in the expanded configuration is in generally out-of-plane relation with respect to the back panel.
- 35 7 An expandable travelling case according to any one of claims 2 to 5, wherein the tensioner in the expanded configuration is in generally out-of-plane relation with respect to the holding frame.

8 An expandable travelling case according to claim 7, wherein the tensioner in the expanded configuration of the case is in generally out-of-plane relation, and in the collapsed configuration of the case in generally parallel relation, with respect to both the holding frame and the back panel.

9 An expandable travelling case according to any one of the preceding claims, wherein the case comprises two tensioners located on opposite sides of the case.

10 10 An expandable travelling case according to claim 9, wherein the two tensioners are symmetrically positioned with respect to a median plane of the travelling case.

11 11 An expandable travelling case according to any one of the preceding claims, wherein the flexible jacket or skirt is made of a fabric material.

12 12 An expandable travelling case according to any one of the preceding claims, having a flexible jacket rather than a skirt, wherein the back panel comprises a rigid portion and the flexible jacket surrounds substantially all of the case, and is arranged for a tight fit on at least the rigid portion of the back panel.

13 13 An expandable travelling case according to any one of claims 1 to 11, wherein the flexible jacket or skirt is connected to an edge of the back panel.

14 14 An expandable travelling case according to any one of claims 2 to 13, wherein the holding frame comprises elongated segments of a structural material.

15 15 An expandable travelling case according to any one of claims 2 to 14, wherein the holding frame has an overall length and width generally matching the length and width of the back panel.

16 16 An expandable travelling case according to any one of the above claims, the travelling case comprising a length, a width and a depth, and wherein the at least one tensioner is configured for expanding the depth of the case.

- 17 An expandable travelling case according to claim 16 and claim 2, wherein the holding frame and the back panel have substantially matching projections, the projections being taken in the direction of the depth of the case.
- 5 18 An expandable travelling case according to any one of claims 2 to 17, wherein the back panel and the holding frame are configured for maintaining relatively to each other a generally parallel relation in both the expanded and unexpanded configurations of the case.
- 10 19 An expandable travelling case according to any one of the preceding claims, wherein the back panel has an internally concave shape in which one or more of the tensioners can be folded when the case is collapsed.
- 15 20 An expandable travelling case according to claim 19 and claim 2, wherein the back panel comprises sides projecting out of the main plane of the back panel, and the holding frame is arranged for resting on the back panel in cooperation with said sides when the case is collapsed.
- 20 21 An expandable travelling case according to any one of claims 2 to 20, wherein each tensioner has a back and front end, the back end being configured for interaction with the back panel of the case, and the front end being configured for interaction with, or for being connected to, the holding frame of the case, and wherein the front end of the tensioner is pivotally connected to the holding frame.
- 25 22 An expandable travelling case according to claim 21, wherein the back panel comprises one or more inner retention means, each retention means being configured for engagement with a back end of a tensioner.
- 30 23 An expandable travelling case according to claim 22, wherein the one or more retention means comprises one or more respective locking means.
- 35 24 An expandable travelling case according to claim 22 or 23, wherein each tensioner is configured for folding inwardly with respect to the back panel and the holding frame.

- 25 An expandable travelling case according to any one of the preceding claims, wherein the or each tensioner are located internally of an internal volume defined by the case.
- 5 26 An expandable travelling case according to any one of the preceding claims, wherein the flexible skirt or jacket is configured to fold on or over the back panel.
- 27 An expandable travelling case according to any one of the preceding claims, wherein the flexible skirt or jacket comprises fold lines.
- 10 28 An expandable case according to any one of the preceding claims, wherein the or each tensioner is pivotally attached to the flexible skirt or jacket.
- 15 29 An expandable case according to any one of the preceding claims, wherein the or each tensioner is a tensioning panel.
- 30 An expandable case according to claim 29, wherein the or each tensioning panel extends along a side of the case.
- 20 31 An expandable case according to claims 9, 16 and 30, each tensioning panel extending substantially over the length of the case in the expanded or unexpanded configurations of the case, and extending substantially over the depth of the case in the expanded configuration of the case.
- 25 32 An expandable case according to claim 31, two corresponding parts of a retention means being mounted respectively one on the back panel and the other on one of the tensioning panels.
- 30 33 An expandable case according to claim 31 or 32, further comprising two opposed reinforcement panels extending across the width of the case on opposing sides, said reinforcement panels being deployable for reinforcement when the case is expanded.

34 An expandable case according to claim 33, wherein the reinforcement panels can be retracted or folded away when the case is collapsed to a store-away configuration.

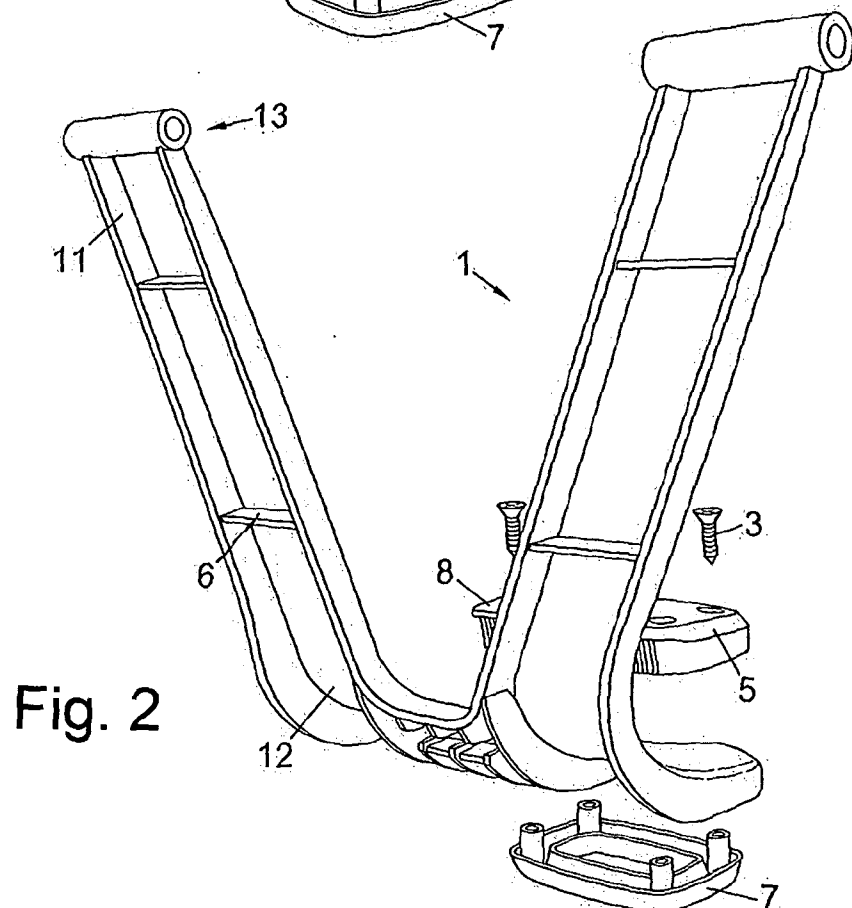
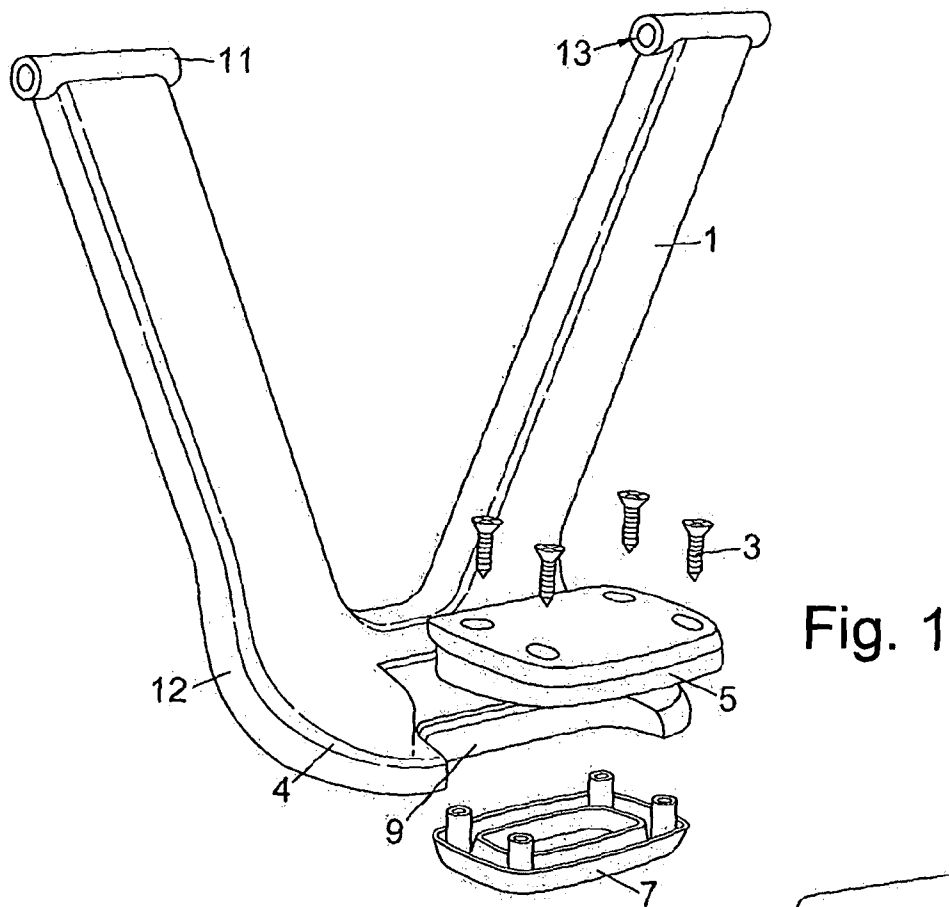
5 35 An expandable case according to claim 34, wherein at least one of the reinforcement panels is locked into its deployed configuration by at least one of the tensioning panels when the case is expanded.

10 36 An expandable case according to any one of the preceding claims, further comprising a top cover which can be operated by a user to open and access the case, or to close the case and prevent access thereto.

37 An expandable case according to claim 36, wherein the top cover is hingedly attached to the flexible skirt or jacket.

15 38 An expandable travelling case substantially as hereinbefore described with reference to any one or more of Figures 1 to 14, or to any one or more of Figures 15 to 71, of the accompanying drawings.

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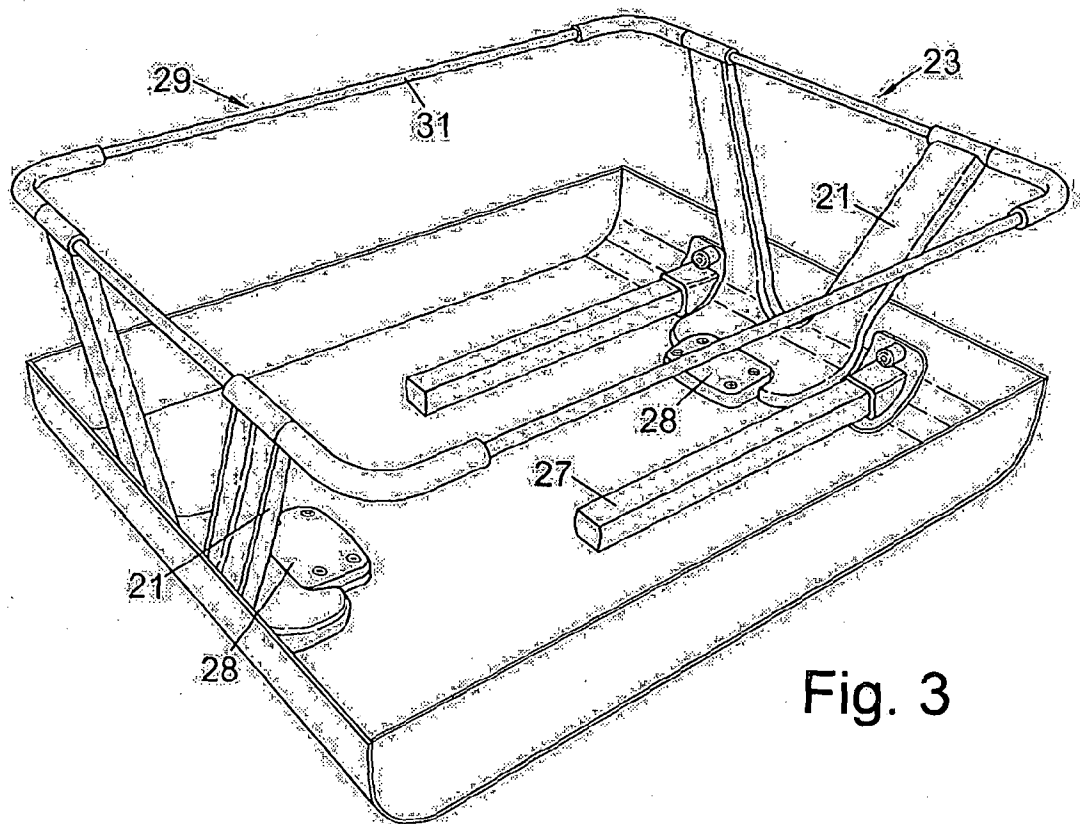


Fig. 3

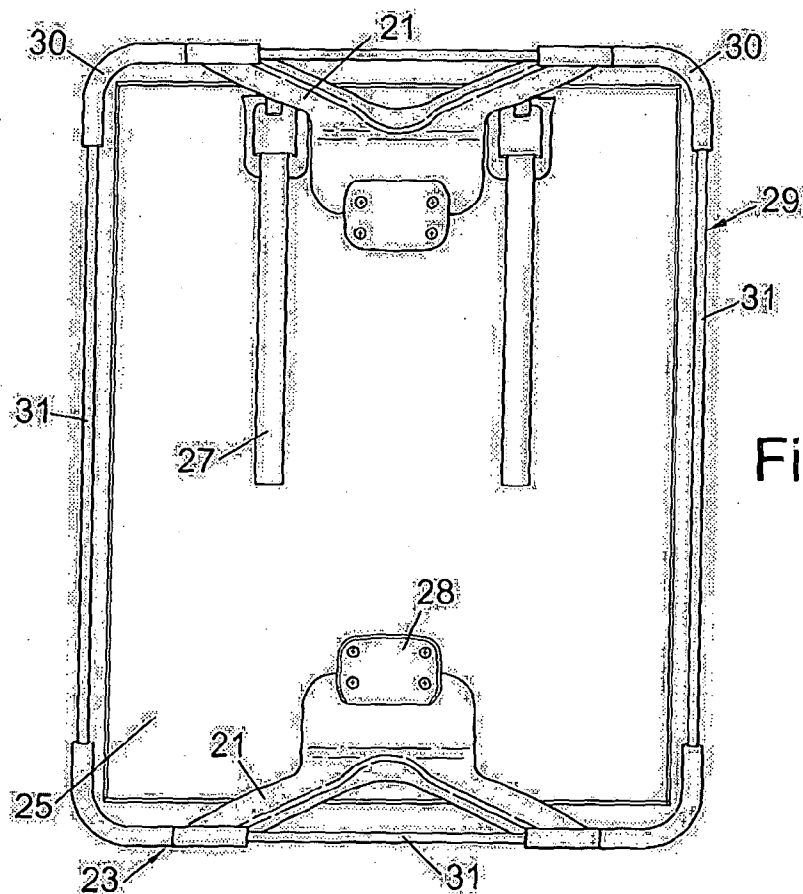


Fig. 4

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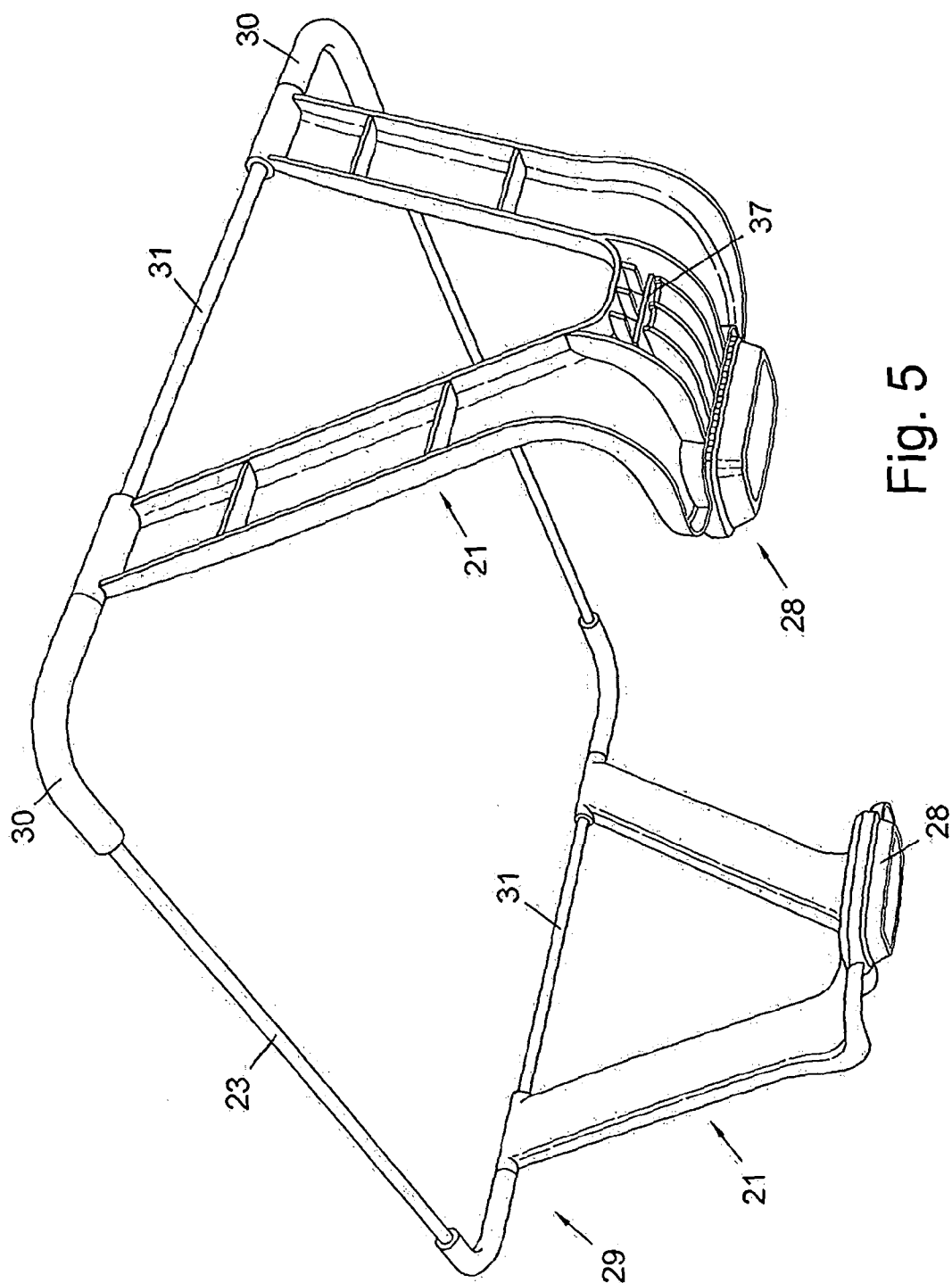


Fig. 5

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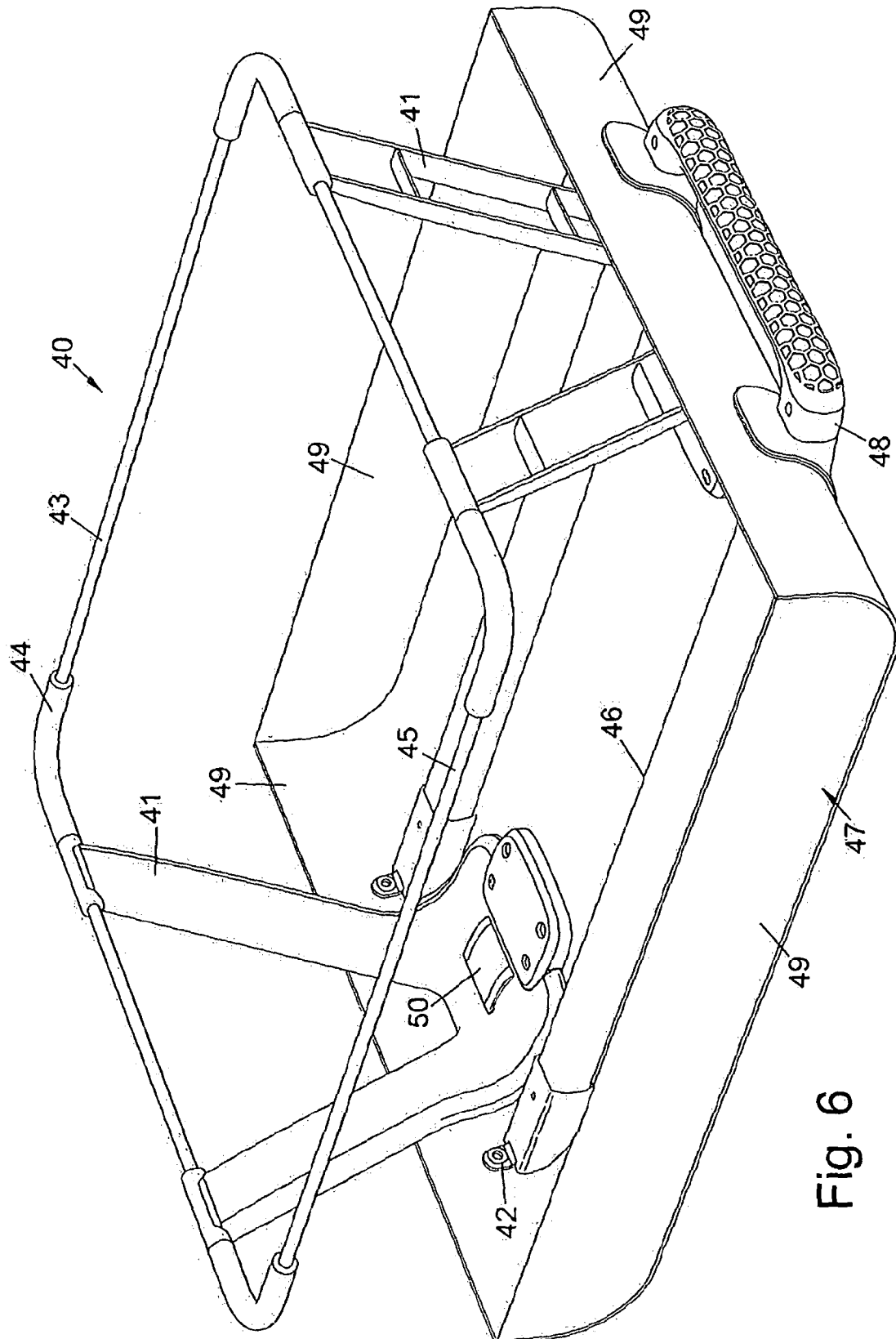


Fig. 6

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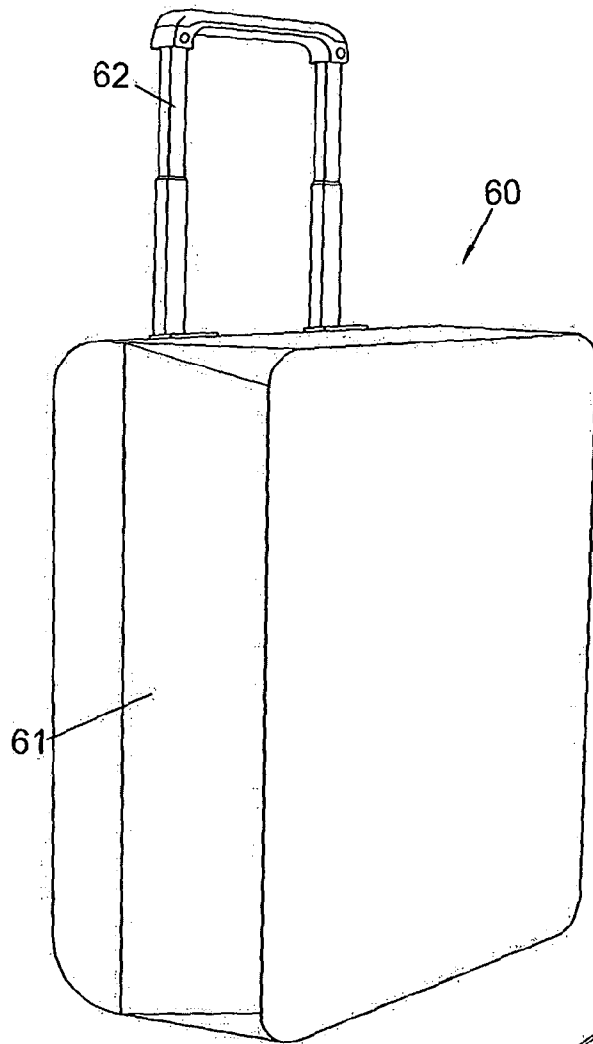


Fig. 7

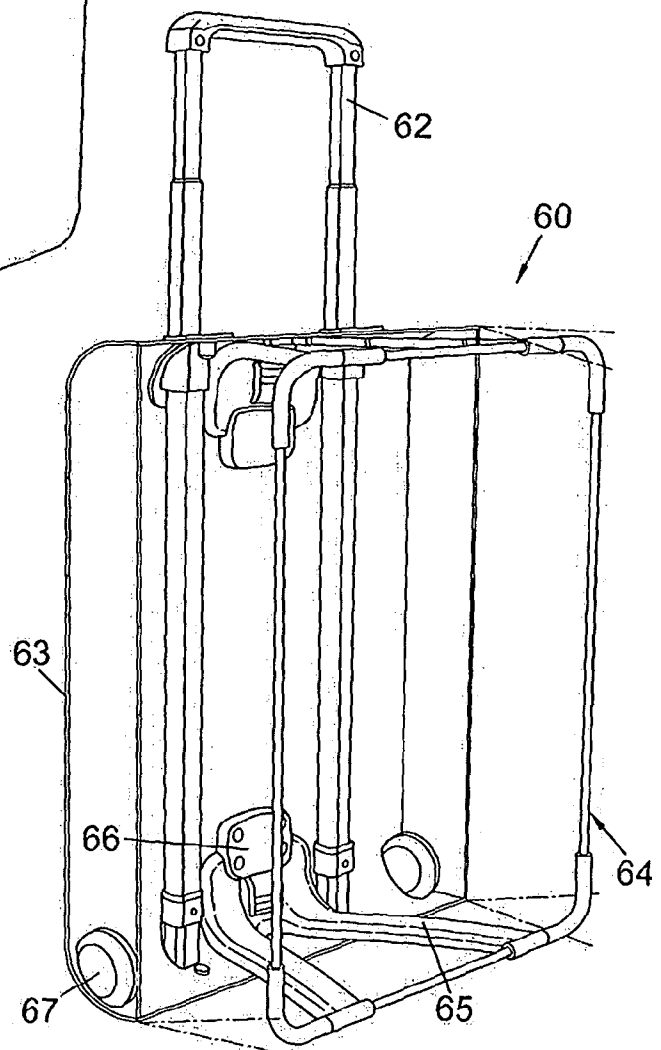


Fig. 8

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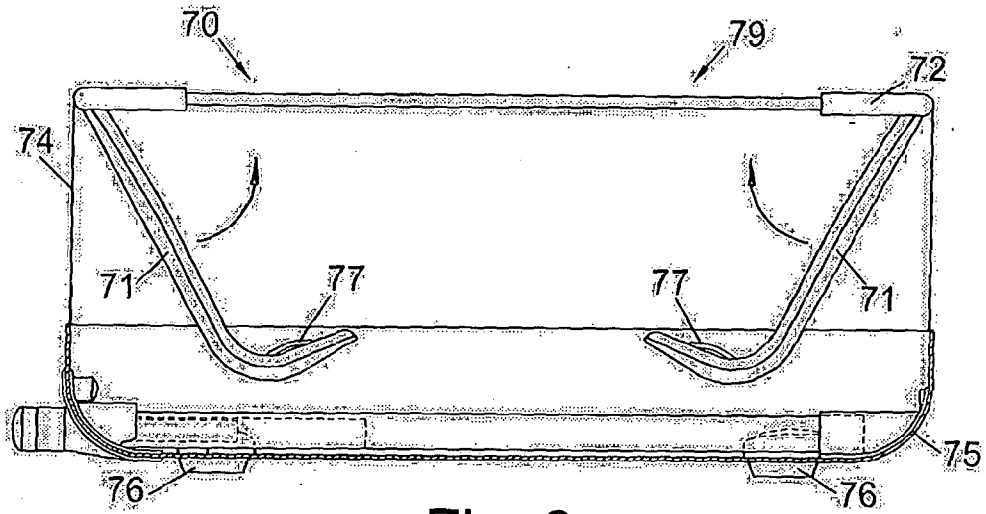


Fig. 9

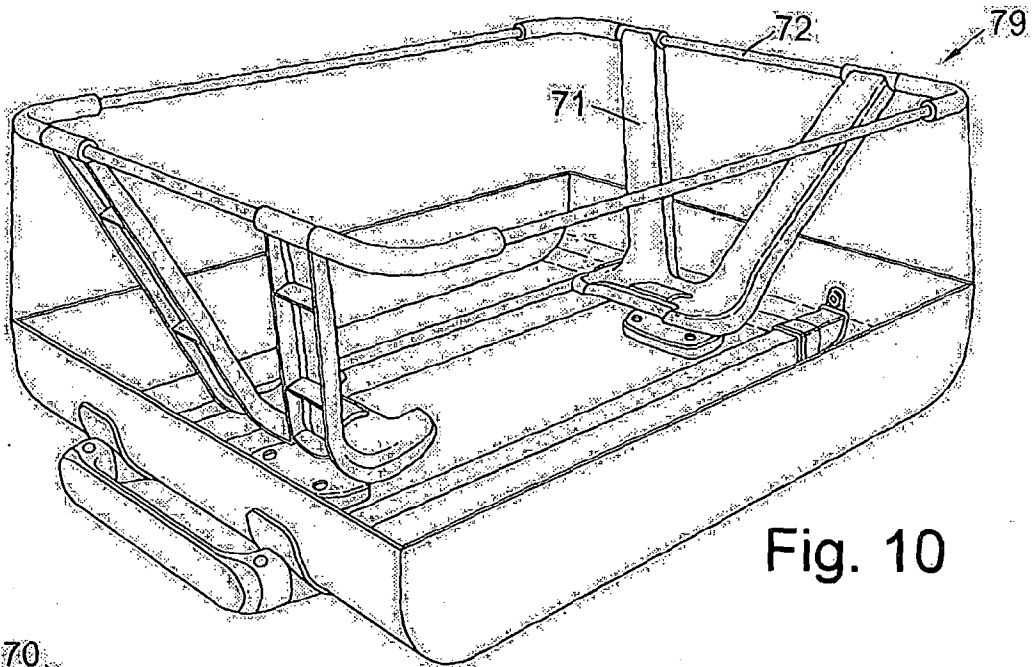


Fig. 10

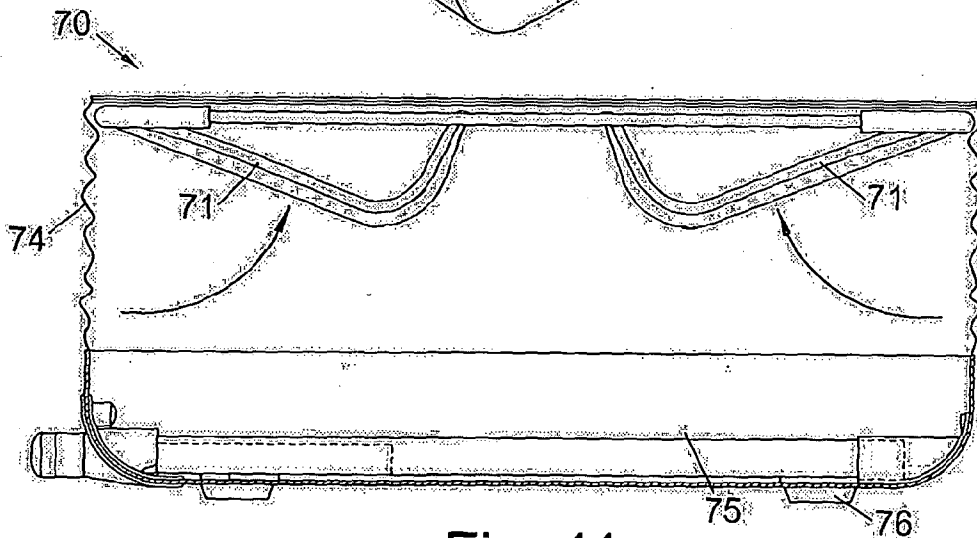


Fig. 11

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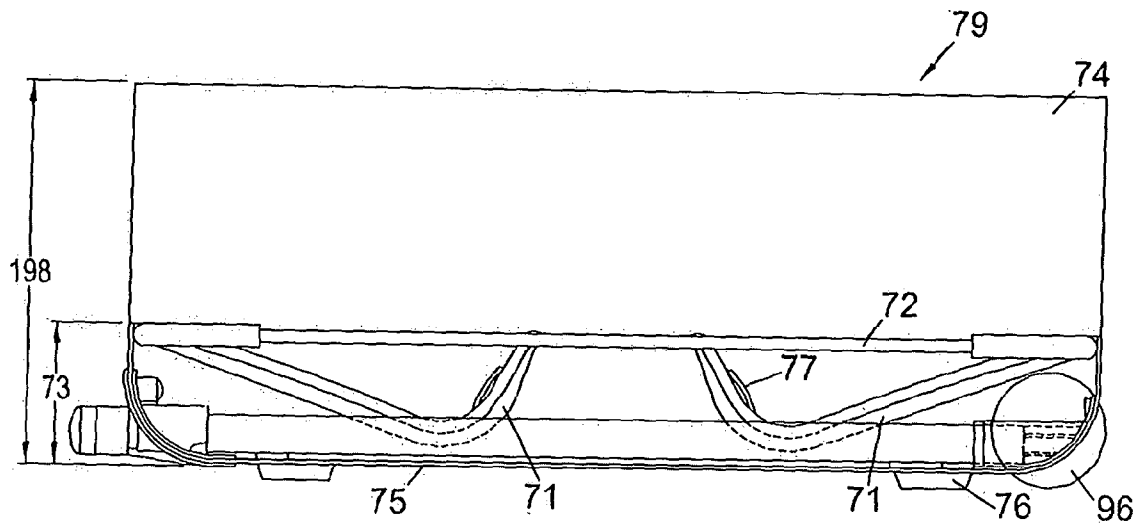


Fig. 12

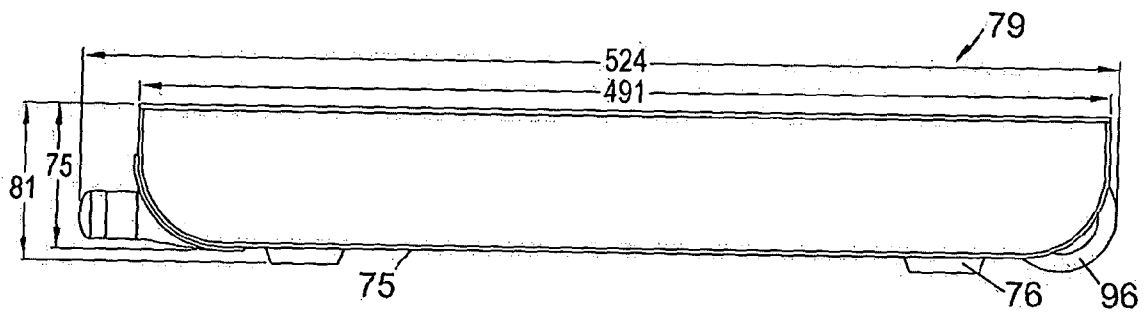


Fig. 13

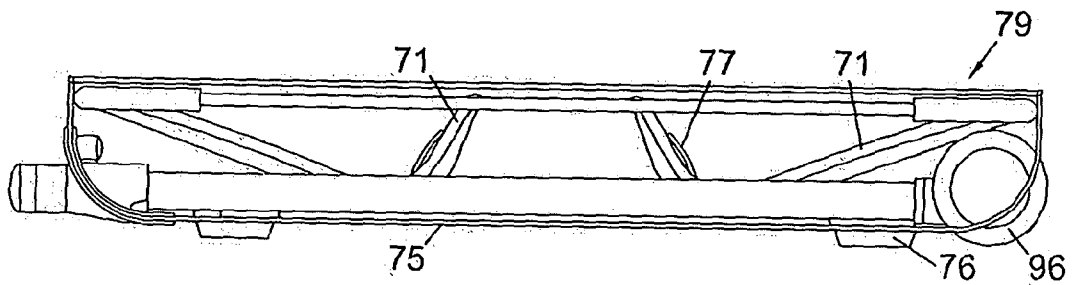


Fig. 14

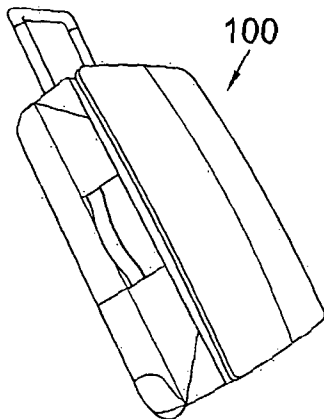


Fig. 15

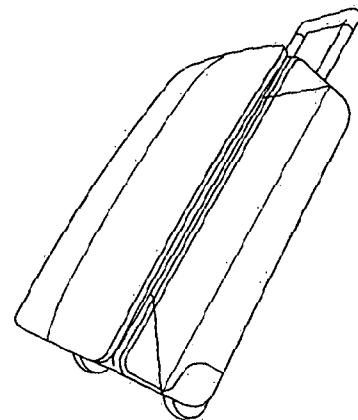


Fig. 16

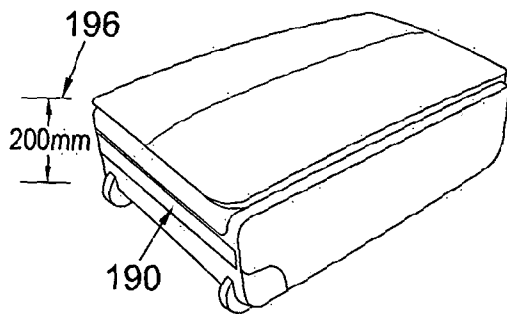


Fig. 17

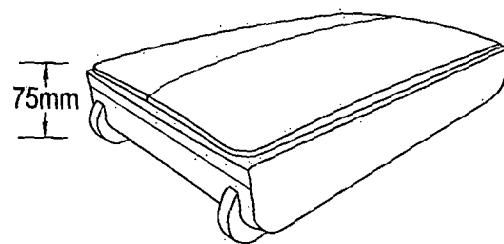


Fig. 18

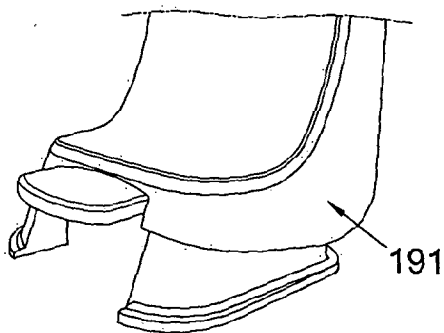


Fig. 19

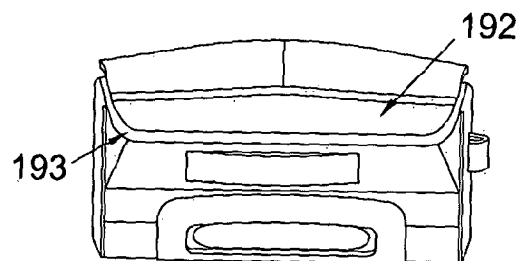


Fig. 20

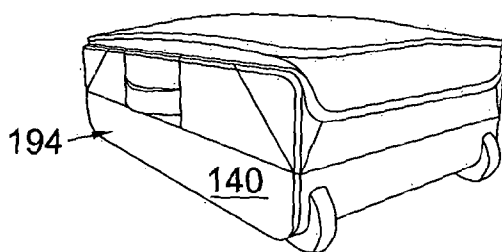


Fig. 21

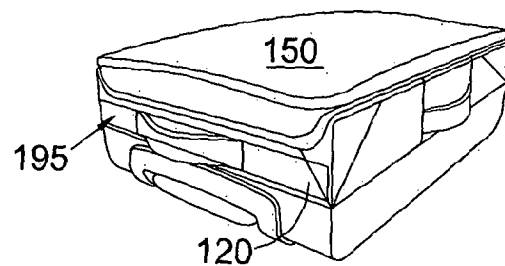


Fig. 22

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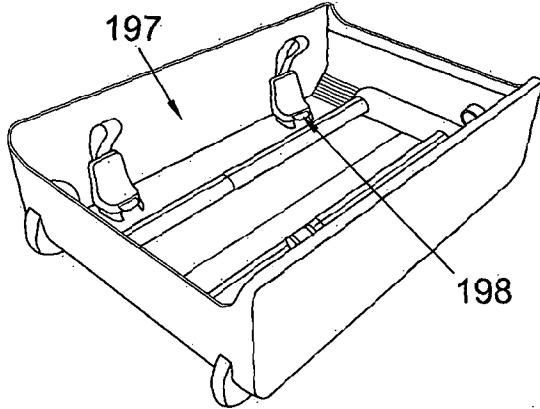


Fig. 23

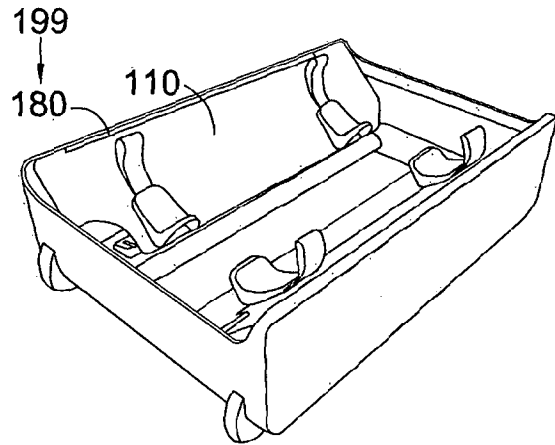


Fig. 24

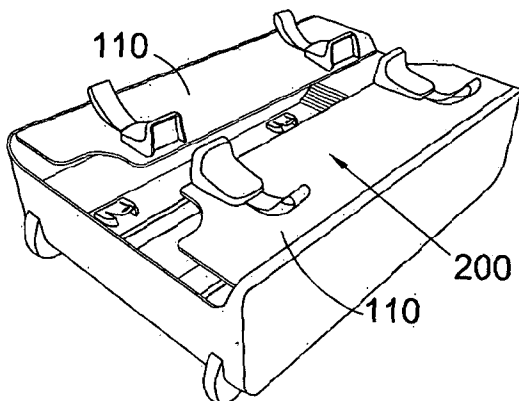


Fig. 25

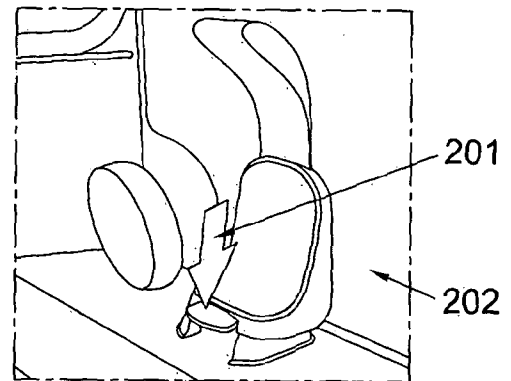


Fig. 26

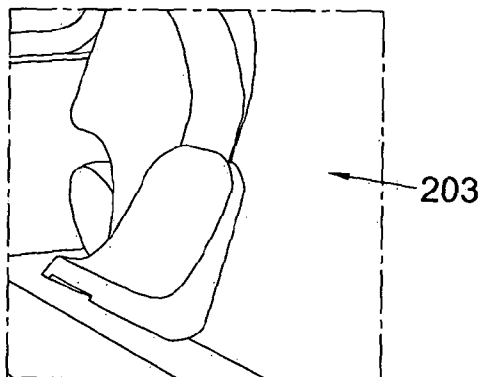


Fig. 27

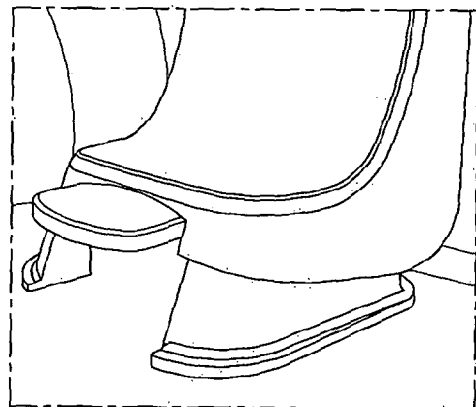


Fig. 28

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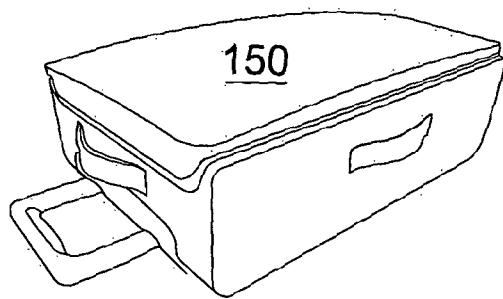


Fig. 29

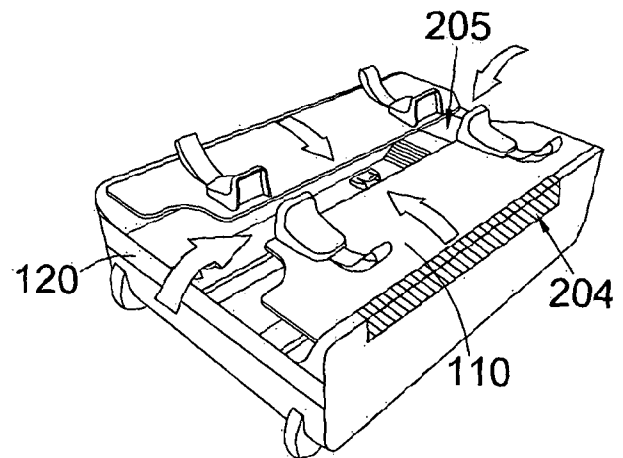


Fig. 30

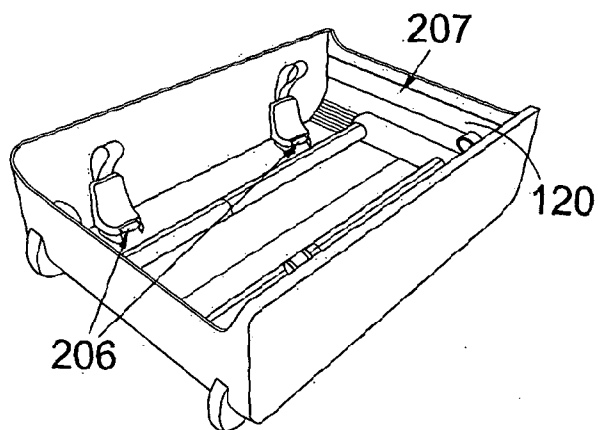


Fig. 31

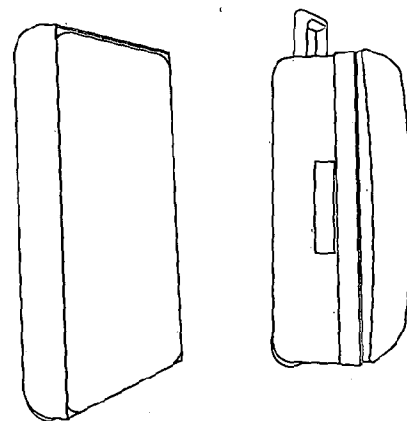


Fig. 32

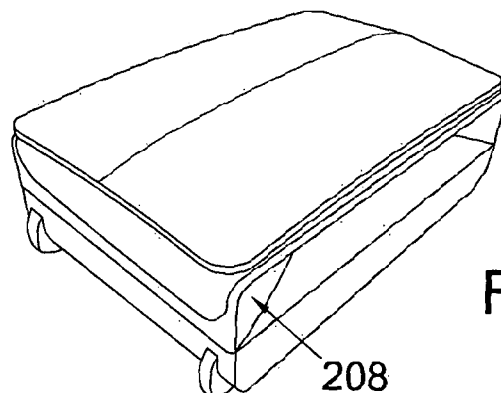


Fig. 33

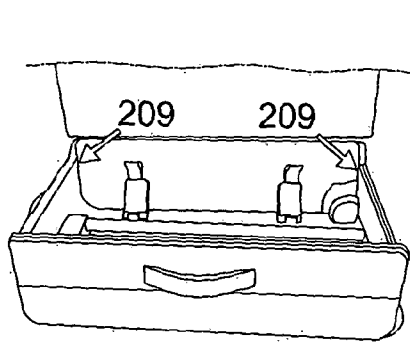


Fig. 34

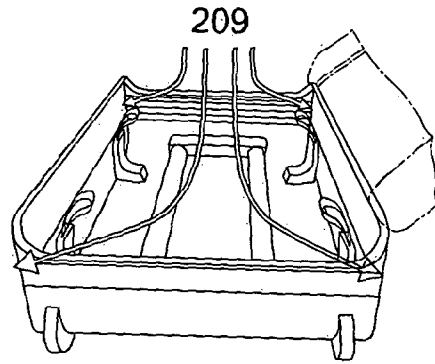


Fig. 35

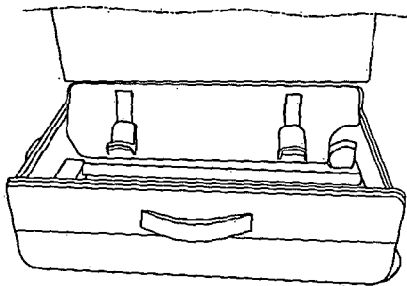


Fig. 36

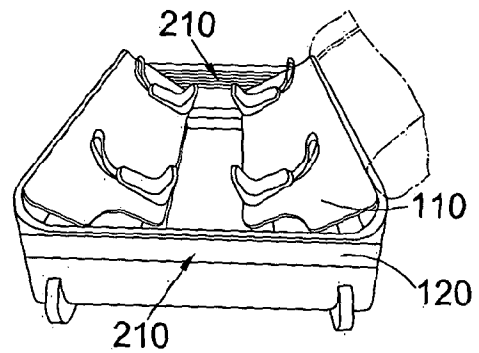


Fig. 37

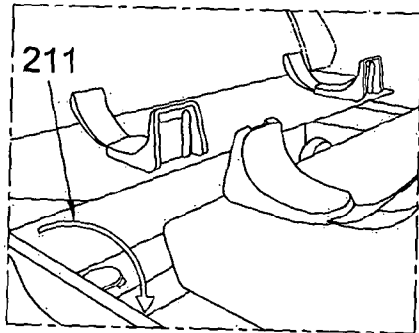


Fig. 38

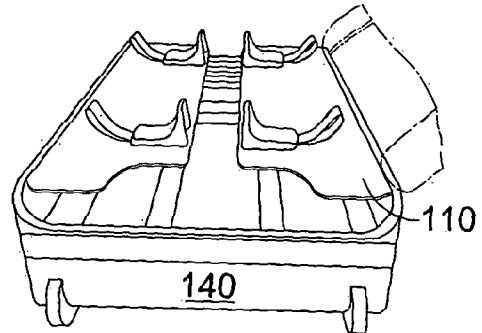


Fig. 39

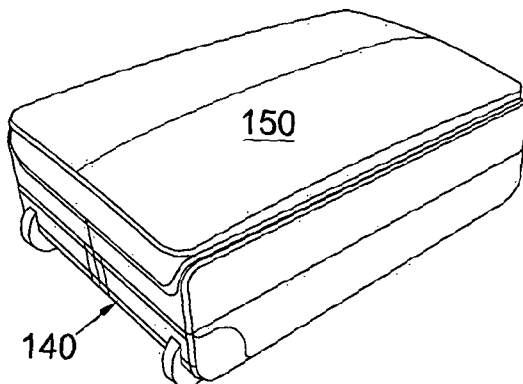


Fig. 40

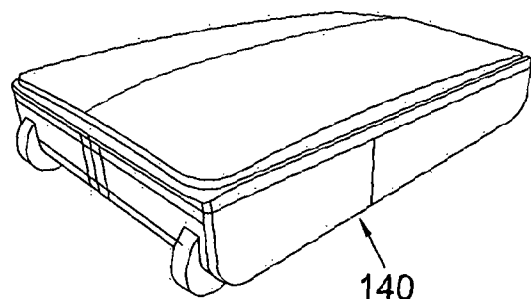


Fig. 41

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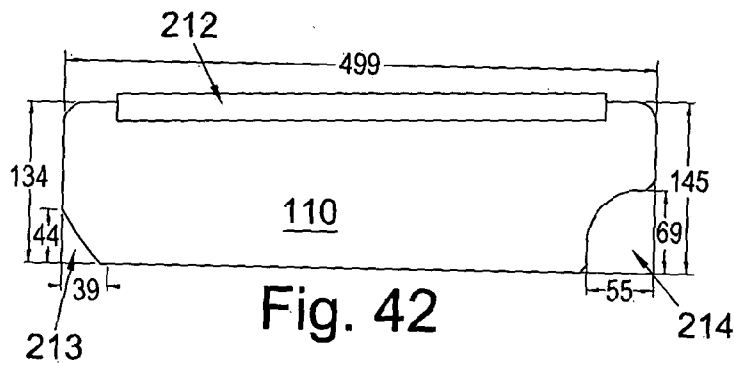


Fig. 42

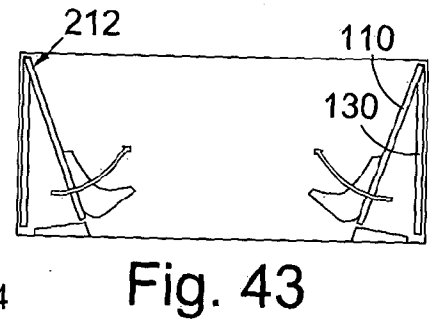


Fig. 43

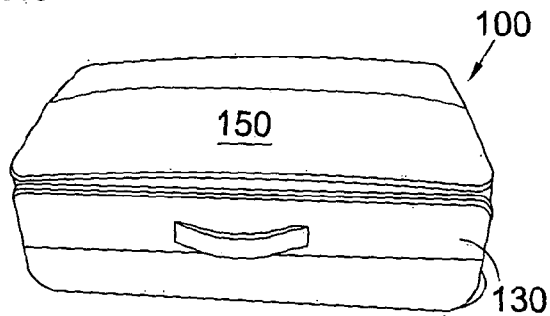


Fig. 44

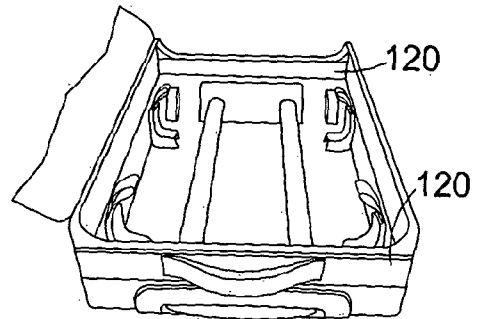


Fig. 45

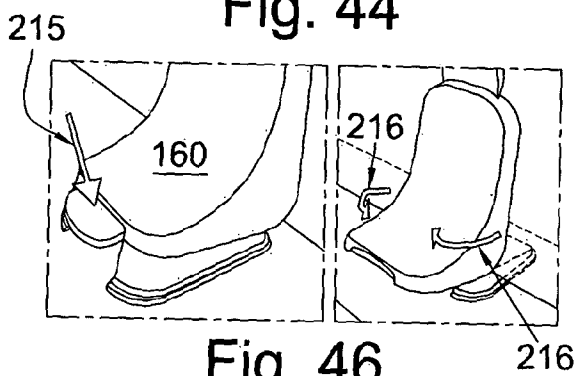


Fig. 46

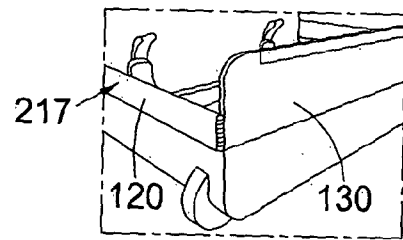


Fig. 47

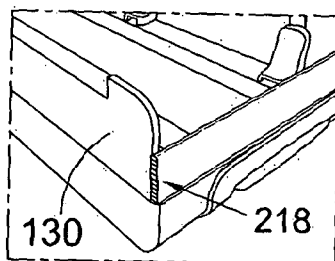


Fig. 48

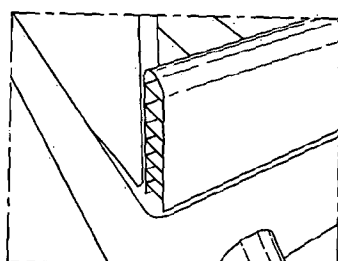


Fig. 49

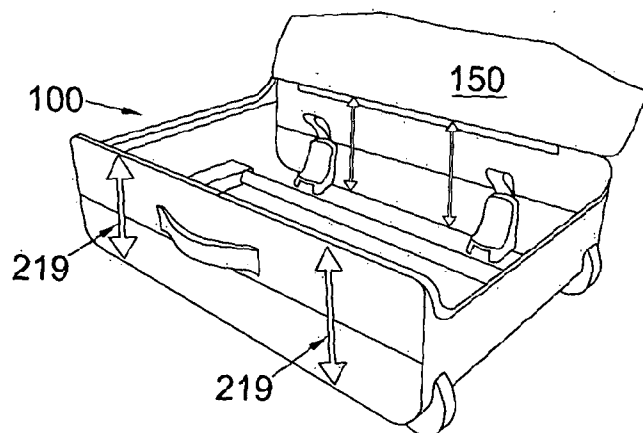


Fig. 50

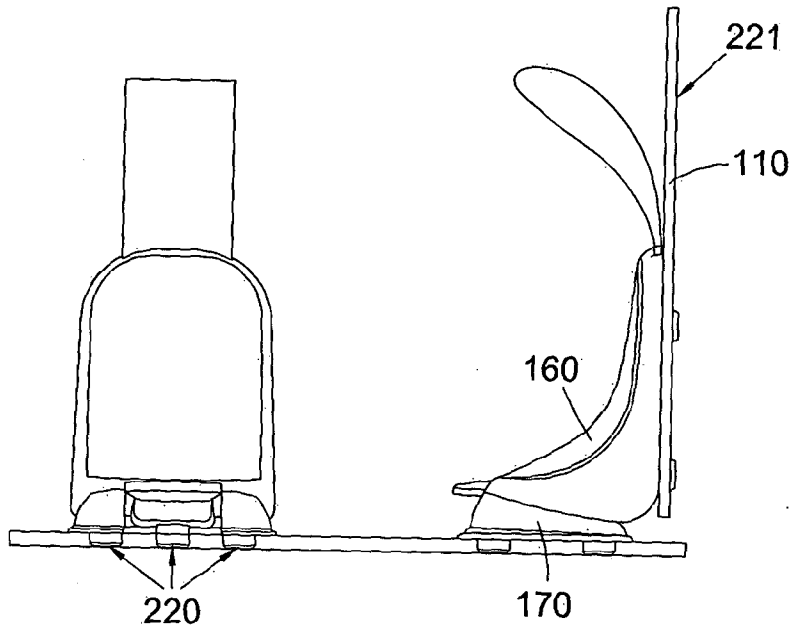


Fig. 51

Fig. 52

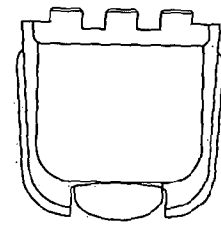


Fig. 53

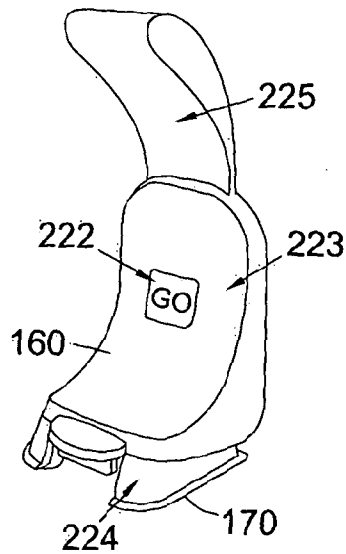


Fig. 54

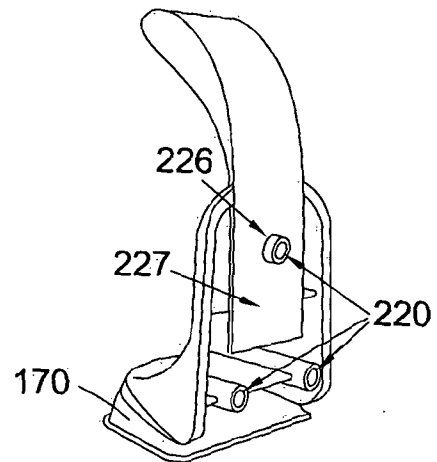


Fig. 55

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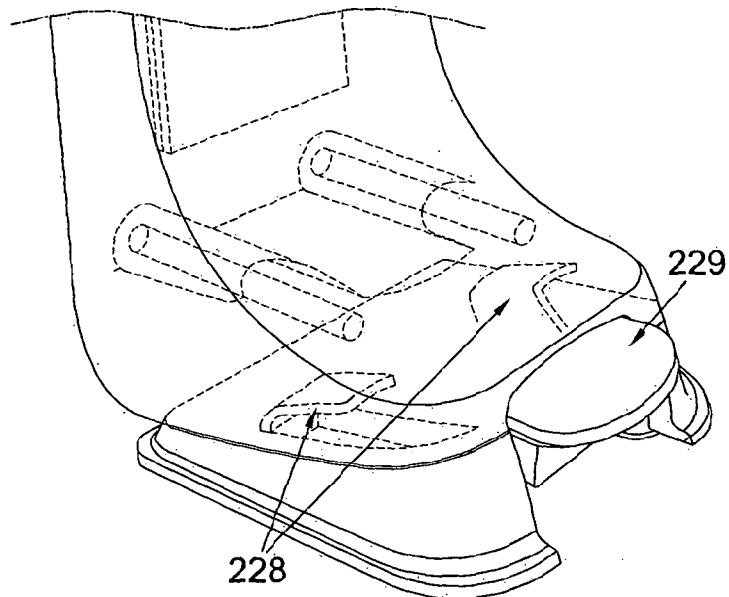


Fig. 56

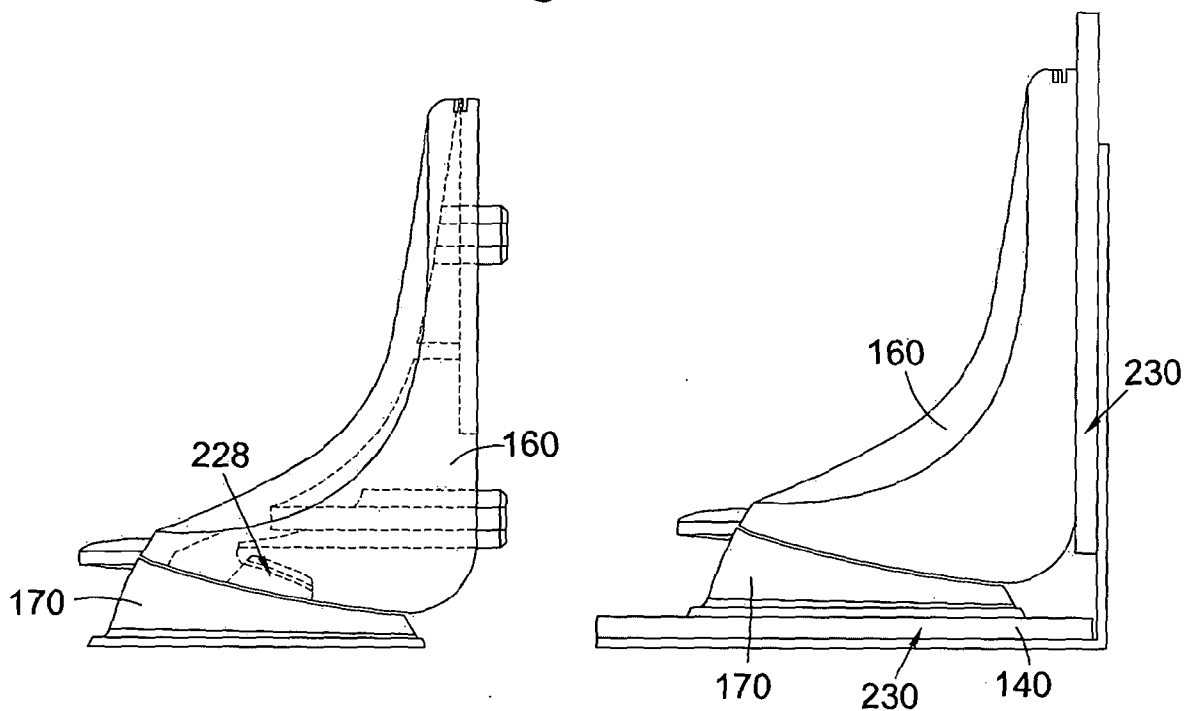
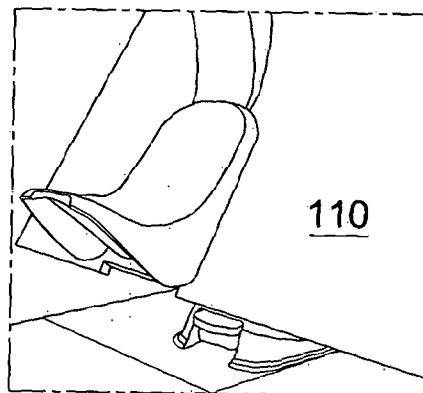
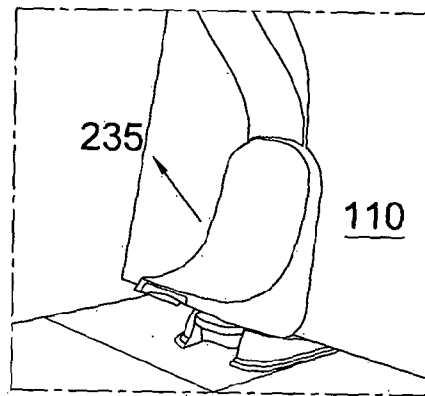
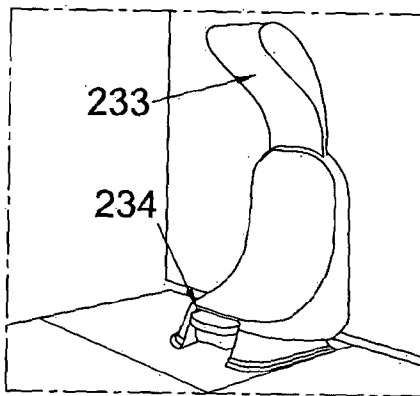
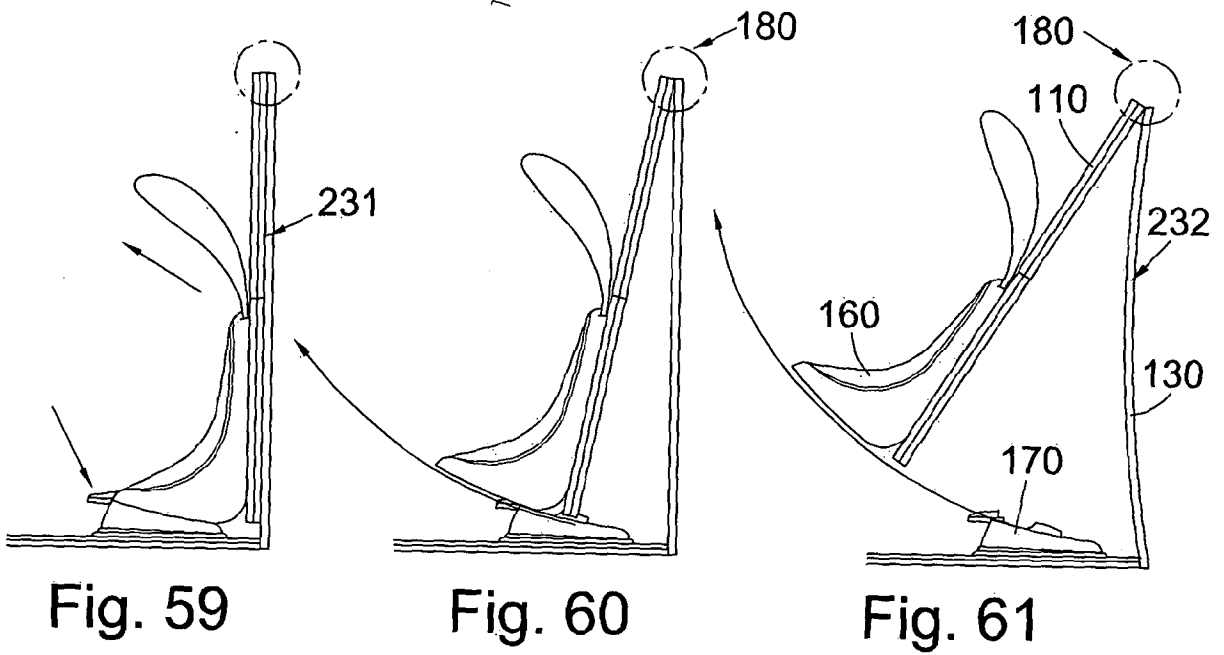


Fig. 57

Fig. 58



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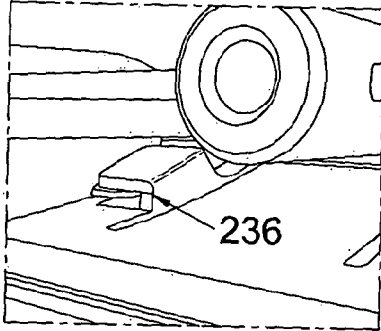


Fig. 65

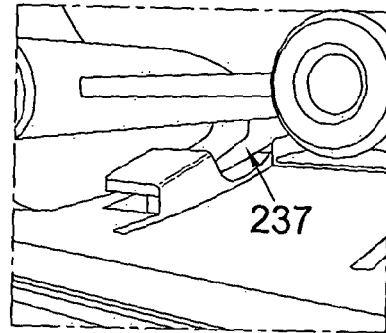


Fig. 66

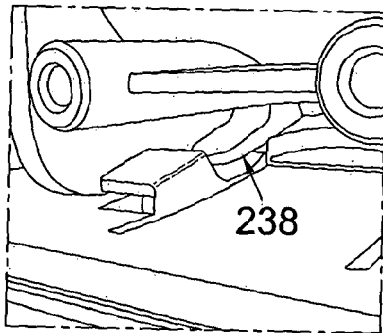


Fig. 67

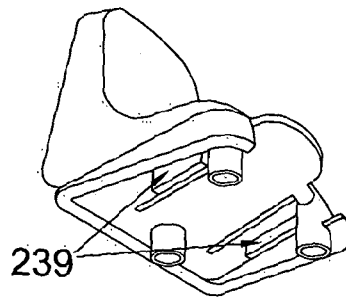


Fig. 68

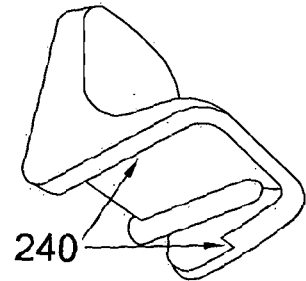


Fig. 69

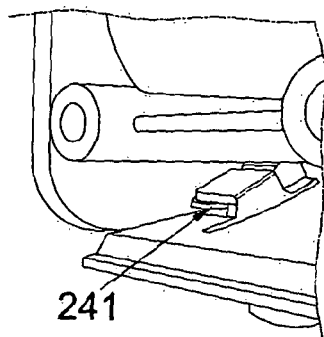


Fig. 70

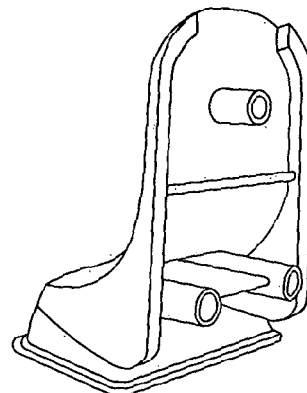


Fig. 71