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(54) **Foldable backpack**

(57) The invention provides a school bag or backpack of the type having a back, a bottom, a flexible receptacle and at least one over-the-shoulder carrying strap, further provided with a bi-stable structure comprising a rigidifying back element articulated to a rigidifying base to allow stable upright positioning on a horizontal surface while loading and unloading the contents of the backpack, the bi-stable structure being insertable into the backpack during manufacture, and which struc-

ture can be made to assume a first stable position in which the rigidifying base is folded back against the rigidifying back element and when thus disposed in the backpack to retain the bottom thereof folded up towards the back of the backpack reducing the bulk thereof, and a second position in which the two rigidifying members define a substantially stable right-angle configuration therebetween thereby to also maintain such a configuration between the back and the bottom of the backpack.

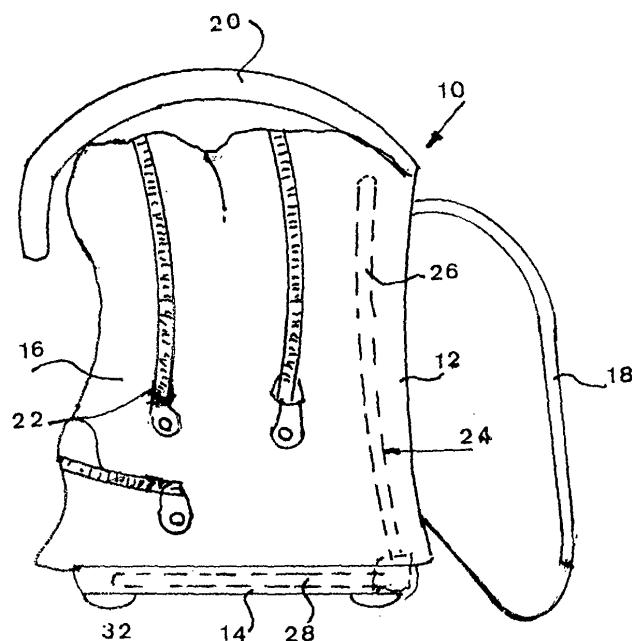


Fig. 1

EP 1 269 884 A2

Description

[0001] The present invention relates to a schoolbag or backpack of the type having at least one over-the-shoulder carrying strap and more particularly the invention provides a jointed structure which rigidifies the backpack when in use and reduces its bulk when in storage.

[0002] Backpacks or rucksacks, equipped with a pair of shoulder straps or with a diagonal sling strap, are convenient and popular receptacles for luggage allowing travelers to carry in reasonable comfort whatever belongings they wish to take on their journey. Both hands of the traveler are left free and a load which would be tiring to carry by hand in a suitcase is carried more easily by the back. Backpacks are in extensive use by school-age children, who use them not only as school bags and lunch carriers, but also as status symbols. Manufacturers, being aware of this potential, produce brightly colored school bags with many zip-closed compartments, padding to increase comfort by eliminating load concentration, and further added features and decoration to attract young customers. By use of light-weight materials the total weight of the bag is kept to about 1 - 2 kg, depending on size.

[0003] Basically a good quality school bag consists of a semi-rigid back wall anchoring the shoulder straps, a semi-rigid base at right angles to the back, and a flexible container taking up the volume defined by the back over the base.

[0004] Bags are available which are completely flexible and these of course present no space problem. However such bags are not considered to be of good quality because the load on the back of the wearer is not distributed correctly, and the lack of a base that is at least semi-rigid results in inconvenience during loading and in distortion of books during use.

[0005] While of low weight, the backpack with a rigidified base is bulky and presents a problem for manufacturers and wholesalers who need to store large quantities before the start of a new school year. Transport, particularly for export, is also expensive for the same reason. Perhaps the most pressing reason to overcome the problem of bulk is the reluctance of retailers to stock sufficient quantities and different styles, colors and sizes. There are different styles for boys and girls. On the one hand, at retail outlets there is fierce competition for shelf and display space, yet sales depend on retailers being able to carry enough stock to meet the demands of a child who has decided that he wants, for example, a green, size 3 school bag decorated with space invaders.

[0006] Although no directly similar prior art could be found, the following disclosures are indicative of the nearest related work to the subject of the invention.

[0007] In US Patent no. 4,356,942 Hayes discloses a rucksack with an internal rigid frame, attached to an external plate. The plate allows different width spacing for the shoulder straps.

[0008] A backpack capable of being collapsed into a satchel orientation is disclosed by Fresco in US Patent no. 5,609,278. The backpack has an upper and a lower compartment, and can be secured over the wheel sides of a bicycle in pannier orientation.

[0009] A school bag which can be expanded is seen in US Design Patent Des.377,415. A zipper extending around three sides of the bag can be opened to extend bag thickness.

[0010] It is therefore one of the objects of the present invention to provide a method of compacting a school bag of the backpack type in order to reduce required storage volume when not in use.

[0011] It is a further object of the present invention to achieve back rigidity and bulk reduction while adding no more than 200 grams weight to an average size school bag.

[0012] The present invention achieves the above objects by providing a school bag or backpack of the type having a back, a bottom, a flexible receptacle and at least one over-the-shoulder carrying strap, further provided with a bi-stable structure comprising a rigidifying back element articulated to a rigidifying base to allow stable upright positioning on a horizontal surface while loading and unloading the contents of the backpack, the bi-stable structure being insertable into the backpack during manufacture. The structure can be made to assume a first stable position in which the rigidifying base is folded back against the rigidifying back element and when thus disposed in the backpack to retain the bottom thereof folded up towards the back of the backpack reducing the bulk thereof, and a second position in which the two rigidifying members define a substantially stable right-angle configuration therebetween thereby to also maintain such a configuration between the back and the bottom of the backpack.

[0013] In a preferred embodiment of the present invention there is provided a school bag or backpack wherein the rigidifying base is attached to the bottom of the backpack.

[0014] In a most preferred embodiment of the present invention there is provided a school bag or backpack wherein the rigidifying back element and the rigidifying base are of substantially U-shaped configuration and wherein the two spaced-apart arm ends of a first of the elements and the two spaced-apart arm ends of the second element are respectively interconnected by a pair of articulating joints.

[0015] The invention will now be described in connection with certain preferred embodiments with reference to the following illustrative figures so that it may be more fully understood.

[0016] With specific reference now to the figures in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of the preferred embodiments of the present invention only and are presented in the cause of providing what is believed to be the most useful and readily un-

derstood description of the principles and conceptual aspects of the invention. In this regard, no attempt is made to show structural details of the invention in more detail than is necessary for a fundamental understanding of the invention, the description taken with the drawings making apparent to those skilled in the art how the several forms of the invention may be embodied in practice.

[0017] In the drawings:

FIG. 1 is an elevational view of a preferred embodiment of the backpack according to the invention;
 FIG. 2 is an elevational view of the same embodiment in its compacted configuration;
 FIG. 3 is a detail view of an embodiment where the bi-stable structure is attached to the bottom of the backpack;
 FIG. 4 is a partially exploded view of the bi-stable structure;
 FIG. 5 is an elevational view of the bi-stable structure in its folded configuration;
 and
 FIG. 6 is a perspective view of the plastic joint housing.

[0018] There is seen in FIGS. 1 and 2 a backpack 10 of the type having a back 12, a bottom 14, a flexible receptacle 16 and a pair of spaced-apart over-the-shoulder carrying straps 18. Also seen in the figure are a bag cover 20 and zipper closures 22 for bag compartments.

[0019] A bi-stable structure 24 comprising a rigidifying back element 26 articulated to a rigidifying base 28 is inserted into the school bag 10 during manufacture. The structure 24 facilitates stable upright positioning on a horizontal surface 30 while loading and unloading the contents of the backpack.

[0020] In FIG. 1 the two rigidifying members 26, 28 define a substantially stable right-angle configuration therebetween. Thereby the backpack is also brought to take up and maintain a right-angle configuration between the back 12 and the bottom 14 thereof.

[0021] When the backpack 10 is empty as seen in FIG. 2, the bi-stable structure 24 can be made to assume a stable position in which the rigidifying base 28 is folded back against the rigidifying back element 26. When thus disposed the structure 24 retains the bottom 14 of the backpack folded up towards the back 12 thereof. Thus the bulk of the backpack is greatly reduced.

[0022] With regard to the rest of the figures, similar reference numerals have been used to identify similar parts.

[0023] Referring now to FIG. 3, there is seen a detail of backpack 32 wherein the rigidifying base 28 is attached to the bottom 14 of the backpack. This is achieved in the shown embodiment by inserting extensions 30 of four thermoplastic feet 32 through apertures 34 in the rigidifying base 28, spacer block 33 and the bottom 14 of the backpack 32. The upper ends of the

extensions 30 are heat-swaged for fast permanent fastening of the bi-stable structure 24 to the backpack 32. The inner lining 35 of the backpack covers attachment arrangement.

[0024] FIG. 4 illustrates the details of the bi-stable structure 24. Both the rigidifying back element 26 and the rigidifying base 28 are of light metal tubing of substantially U-shaped configuration. The two spaced-apart arm ends of the back element 26 and the two spaced-apart arm ends of the rigidifying base 28 are respectively interconnected by a pair of articulating joints 36, which will be further described with reference to FIG. 6. The back element 26 is provided with solid end pieces 38, a spacer bar 40 stabilizes the structure and a variety of appropriate fasteners 42 interconnect the components.

[0025] The main components of the bi-stable structure 44 are suitably made of a light-weight metal alloy such as aluminium. This choice produces a strong structure of total weight of less than 190 gram. For weight-critical applications, replacement of the aluminium by magnesium reduces total structure weight to under 140 gram.

[0026] Seen in FIG. 5 is the bi-stable structure 24, described with reference to FIG. 4, shown here in its folded state.

[0027] Referring now to FIG. 6, there is depicted a detail of an articulated joint 36. The solid end pieces 38 seen in FIG. 4 are pivoted about the hole 46. An edge lip 48 is positioned to press against - but to allow passage of the solid end pieces 38, when the structure is between folded and deployed at 90 degrees. At the end positions (folded and deployed) no rotational resistance is exerted. The friction provided by the edge lip 48 is augmented by side friction pads 50, which press against the sides of the end pieces 38.

[0028] It is realized that there are many other types of detent devices which could be used for retaining the structure in the two required positions until a substantial torque is applied to move the arms out of their existing orientation. Nevertheless it is considered that the joint described in the present specification is advantageous as providing low weight and low costs.

[0029] It will be evident to those skilled in the art that the invention is not limited to the details of the foregoing illustrative embodiments and that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

Claims

1. A school bag or backpack of the type having a back,
a bottom, a flexible receptacle and at least one over-
the-shoulder carrying strap, further provided with a 5
bi-stable structure comprising a rigidifying back el-
ement articulated to a rigidifying base to allow sta-
ble upright positioning on a horizontal surface while
loading and unloading the contents of said back- 10
pack, said bi-stable structure being insertable into
said backpack during manufacture, and which
structure can be made to assume a first stable po-
sition in which said rigidifying base is folded back
against said rigidifying back element and when thus 15
disposed in said backpack to retain the bottom
thereof folded up towards said back of said back-
pack reducing the bulk thereof, and a second posi-
tion in which said two rigidifying members define a
substantially stable right-angle configuration there- 20
between thereby to also maintain such a configura-
tion between said back and said bottom of said
backpack.
2. A school bag or backpack according to claim 1,
wherein said rigidifying base is attached to said bot- 25
tom of said backpack.
3. A school bag or backpack according to claim 1,
wherein said rigidifying back element and said rigid-
ifying base are of substantially U-shaped configura- 30
tion and wherein the two spaced-apart arm ends
of a first of said elements and the two spaced-apart
arm ends of the second element are respectively
interconnected by a pair of articulating joints. 35
4. A school bag or backpack according to claim 1,
wherein said rigidifying back element and said rigid-
ifying base are made of a light-weight metal alloy.
5. A school bag or backpack according to claim 4, 40
wherein said metal is aluminium.
6. A school bag according to claim 1, wherein the total
weight of said bi-stable structure is less than 190
gram. 45

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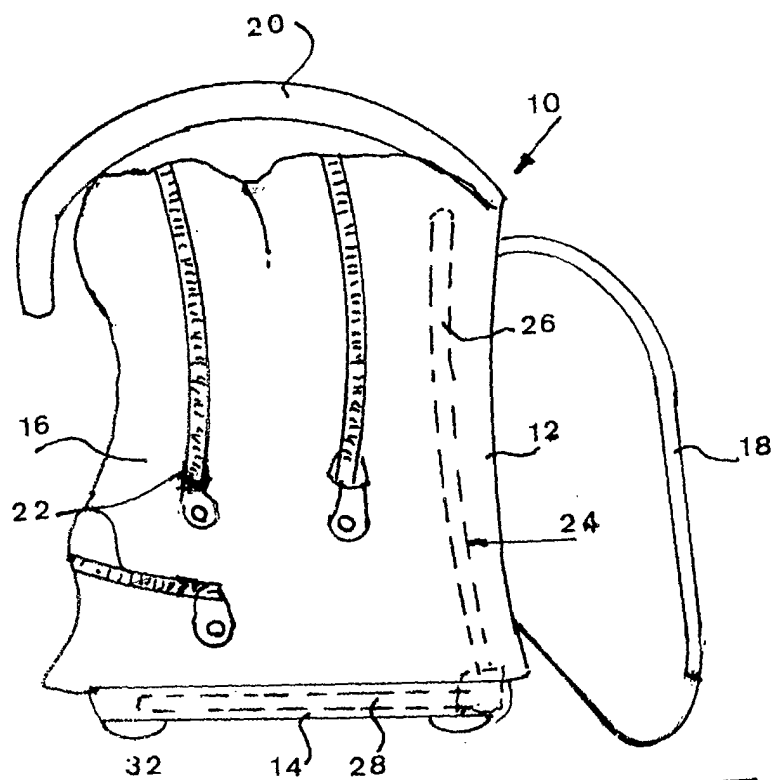


Fig. 1

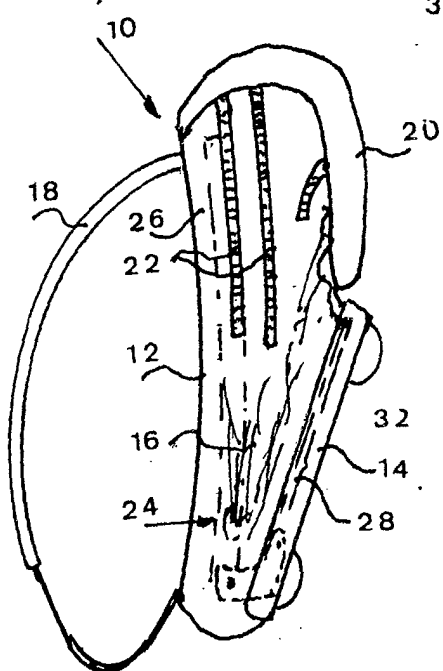


Fig. 2

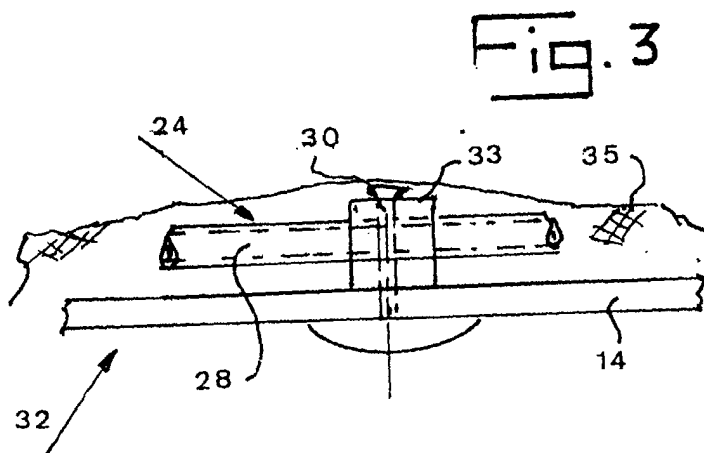


Fig. 3

