

SHOCK- PROTECTING PACKAGING

This invention relates to packaging and is concerned particularly with packaging for use in protecting articles against damage and shock during storage and transit.

Various packaging methods have been used for protecting, for example electronic components, during storage and transit. These methods, in addition to being generally labour-intensive, commonly involve a substantial outlay in cost and material-resources on packaging items in the form, for example, of cardboard cases and specially-designed items of plastics foam and corrugated cardboard to fit within them.

A form of packaging case that may be used with advantage environmentally and economically is described in GB-A-2414728. The rectangular packaging case described is of a thermoformed plastics-sheet construction having four walls that are hinged together to fold from flat in erection of the case round the article or articles to be protected. Although this form of packaging case has been found to be very effective in providing shock protection, some articles such as flat-screen television sets and other heavy domestic electronic products, computer monitors and computers themselves, are in general too large to be accommodated in cases of this form. The present invention is concerned with providing an alternative form of packaging that may be used in these circumstances.

According to the present invention, there is provided a one-piece thermoformed packaging device for article shock-protection, wherein the device comprises a plurality of elongate wings which are hinged together and which each have upstanding flanges that are spaced apart laterally of the respective wing to define an intervening channel for receiving a portion of the article to be protected from shock.

A portion of each wing may abut a portion of another of the wings when the device is folded about the hinge by which those two wings are hinged together. Ridges with intervening grooves may run longitudinally of the two wings within the mutually-abutting portions for ridge-within-groove nesting between them. The said portions may be inclined portions of the flanges, and may form a mitre joint, for example of 90 degrees, when in mutual abutment.

Examples of thermoformed packaging devices in accordance with the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an article packaged for shock-protection using a plurality of thermoformed packaging devices in accordance with the present invention;

Figure 2 is a perspective view of one of the thermoformed packaging devices according to the invention used in the arrangement of Figure 1;

Figure 3 is perspective view of the thermoformed packaging device of Figure 2 when folded flat;

Figure 4 is a schematic representation to an enlarged scale, illustrative of accommodation of a part of an article within the thermoformed packaging device of Figures 2 and 3;

Figures 5 to 10 are further illustrative of the way in which thermoformed devices according to the present invention may be used for article shock-protection; and

Figure 11 is illustrative at (a) to (c) of a three-stage sequence used for locking together thermoformed illustrated and described below with reference to Figures 9 and 10.

Referring to Figure 1, a large and heavy article A (depicted as a computer component in the form of a server drawer in this example) is protected for transportation and storage by four corner caps 1. Each corner cap 1 is a one-piece thermoformed moulding (for example of high density polyethylene or polypropylene) that has two rectangular wings 2 and 3 and folds into the L-shape corner form. The folded and unfolded conditions of each corner cap 1 are illustrated in Figures 2 and 3 respectively.

Referring now also to Figures 2 and 3, the two wings 2 and 3 are interconnected by an integral hinge 4 and on the inside of the moulding are each formed along their opposite, longitudinal margins with ridge-groove patterns 5 and 6. The longitudinal margins of each wing 2 and 3 are defined on the inside by a pair of upstanding flanges or shoulders 7 and 8 that rise to full height at 45 degrees throughout an initial, inclined portion 9 of the wing-length from the hinge 4. The ridges with intervening grooves of the patterns 5 and 6 run throughout the full length of the respective shoulders 7 and 8.

Three circular recesses 11 are located between the shoulders 7 and 8 of each wing 2 and 3. Each recess 11 is of tiered form in that its diameter decreases progressively in steps with depth to create resilient projections 12 on the outside of the moulding (see Figure 1) that afford shock-protection.

As shown most clearly in Figure 2, the wings 2 and 3 fold towards one another on the hinge 4. This brings the two shoulders 7 and 8 of each wing 2 and 3 into abutment with the shoulders 7 and 8 respectively of the other wing, throughout their inclined portions 9 to form a mitre joint. The two wings 2 and 3 now extend at right angles to one another and are locked together in this configuration by means of entry and resilient retention of a projection 13 of the wing 2 in a socket 14 of the wing 3. In addition there is interlocking in the abutting

portions 9 between the ridge-groove patterns 5 and 6 of the two wings 2 and 3.

More particularly in the latter regard, the ridges and intervening grooves of each ridge-groove pattern 5 and 6 of the wing 3 are shifted laterally by one-half pitch with respect to the corresponding pattern 5 and 6 of the wing 2. As a result the abutment throughout the portions 9 of the wings 2 and 3 being with ridge-within-groove nesting of shoulder 7 with shoulder 7 and shoulder 8 with shoulder 8. This provides interlocking of the two wings 2 and 3 against relative lateral displacement and also cushioning and absorption of shock tending to close up the wings 2 and 3 further onto one another.

Each corner cap 1 fits to the periphery of the article A as illustrated in Figure 1, with the corner of the article A received in the channel between the shoulders 7 and 8 of each wing 2 and 3. These channels are generally in mutual alignment but can be configured in the thermoforming to be adapted to the specific profile of the article A to be protected. As shown in Figures 2 and 3 by way of example, the channel between the shoulders 7 and 8 is configured in this case to accommodate a portion of the article A of bevelled or curved profile. This is more particularly illustrated schematically to an enlarged scale in the cross-sectional view of Figure 4, where a profiled corner of article A is represented inserted between shoulders 7 and 8. The shoulder 7 in this case is moulded with a scooped-out profile to conform closely to the profile of the article A.

Caps of the same general form (including with ridge-groove patterns corresponding to the patterns 5 and 6 in mitre-joints) of the cap 1 can be utilised for protection other than in the context of corners. In this respect, reference is directed to Figure 5 where a long, rectangular article B is protected at its corners by folded corner caps 20, and along its longer sides by identical, but unfolded, caps 20, all within a lightweight carton 21. The unfolded caps 20 give protection to the sides of

the article B in the space between the folded, corner caps 20, being simply pushed onto the sides in the same way as the folded caps 20 are pushed onto the corners.

As an extension of this, a wrap for article-protection within, for example, a lightweight cardboard or other container, can be produced as illustrated in Figures 6 to 8 of the accompanying drawings. Figure 6 shows in front view a thermoformed wrap 30 composed of four wings 31 to 34 that are hinged together for use in enclosing a computer monitor C to provide it with surround-protection. The base of the monitor C is first entered into the wing 32 ready for wrapping the wings 31 and 33 up round it and the wing 34 over the top to give the result illustrated by Figures 7 and 8.

Each of the wings 31 to 34 is moulded with a configuration similar to that of each of the wings 2 and 3 of the corner caps 1 described above, but of increased length related to the breadth and height of the monitor C. The wings 31 to 34 have inclined faces at both ends so that mitred joints between them together with ridge-within-groove nesting, are established at the corners of the monitor C as the wings 31, 33 and 34 are folded up round it.

Retention of the wings 31 to 34 wrapped round the perimeter of the monitor C is by a locking tab 35 which is hinged to the free end of wing 34 and which involves a stud 35 that is entered and retained resiliently within a cavity (not shown) in the wing 31.

Where the article to be protected is very large it is often not feasible to design and manufacture a wrap capable of extending throughout the full perimeter. In these circumstances a complete peripheral wrap may be produced by assembly together end-to-end of a plurality of thermoformed wrap-components that each comprise two or more hinged wings. An example of a component 40 of this nature that is made up of just two mutually-hinged wings 41 and 42 with a locking tab 43 hinged to

the wing 42, is illustrated in Figure 9. Ridge-within-groove nesting is provided in the mitred joints between the wings 41 and 42.

Figure 10 shows two of the components 40 in the process of being used to provide a peripheral-wrap of a television set D. The D is shown standing in the wing 42 of the lower of the two components 40 with its left-hand side (as seen in Figure 10) entered in the folded-up wing 41. The other component 40 is shown ready to be lowered onto the top of the set D to have the top of the set D entered in the wing 42 and its other side entered in the wing 41. Once this has been accomplished, the two components 40 are locked together using the locking tabs 43 at each of the two diagonally-opposite corners of the set D. The locking at each corner is carried out in the three-stage sequence illustrated at (a) to (c) of Figure 11.

The three-stage locking sequence is illustrated in Figure 11 and will be described in the context of the locking of the upper of the two corners; the locking at the other corner is carried out in a corresponding way.

Referring to stage (a) of Figure 11, the bringing together of the wings 41 and 42 of the two components 40 respectively, is accompanied by entry of a projection 44 of the wing 41 of the lower of the two components 40 into a recess 45 in the wing 42 of the upper component 40. With the projection 44 pushed fully home within the recess 45 as illustrated for stage (b) of Figure 11, the locking flap 43 hinged to the wing 42, is folded over to overlap the junction with the wing 41. Stage (c) of Figure 11 illustrates the folding down of the flap 43 further to bring a projection 46 that project from the underside of the folded-over flap 43, aligned with the projection 44 pushed into the recesses 45. More especially, the alignment brings the projection 46 facing into the reverse recess of the thermoformed projection 44. Finally, the projection 46 is pushed home into the recesses 43 for resilient retention there locking the flap 43 down and

locking the two components firmly together. Retention of this condition is enhanced by virtue of the projection 46 being an interference fit with a snap action into the reverse recess; the snap action is facilitated by the resilience of the thermoformed material.

Claims:

1. A one-piece thermoformed packaging device for article shock-protection, wherein the device comprises a plurality of elongate wings which are hinged together and which each have upstanding flanges that are spaced apart laterally of the respective wing to define an intervening channel for receiving a portion of the article to be protected from shock, a portion of each wing abuts a portion of another of the wings when the device is folded about the hinge by which those two wings are hinged together, and wherein ridges with intervening grooves run longitudinally of the two wings within the mutually-abutting portions for ridge-within-groove nesting between them.
2. A one-piece thermoformed device according to Claim 1 wherein the said portions are inclined portions of the flanges.
3. A one-piece thermoformed device according to Claim 2 wherein the inclined portions of the flanges form a mitre joint when in mutual abutment.
4. A one-piece thermoformed device according to Claim 3 wherein the joint is a 90-degree joint between the two wings.
5. A one-piece thermoformed device according to any one of Claims 1 to 4 wherein the channel of each wing is in alignment with the channel of each other wing.
6. A one-piece thermoformed device according to any one of Claims 1 to 5 wherein one or more recesses are provided in the channel of each of one or more of the wings to afford shock-protection.
7. A one-piece thermoformed device according to Claim 6 wherein one or more of the recesses is of tiered form having a

cross-section that reduces with depth within the recess to afford resilience.

8. A one-piece thermoformed device according to any one of Claims 1 to 7 wherein a locking flap is hinged to a first of the wings for establishing locking closure between the first wing and a second wing of a further one-piece thermoformed device according to any one of Claims 1 to 7, the second wing of the further device has a projection that enters a recess of the first wing of the first-mentioned device on closing together of the first wing of the first-mentioned device and the second wing of the further device, and a projection on the flap of the first-mentioned device is adapted to be brought by hinging of this flap, to snap into a reverse recess of the projection on the second wing of the further device in effecting the locking closure between the first wing of the first-mentioned device and the second wing of the further device.

9. A one-piece thermoformed device for article shock-protection, substantially as hereinbefore described with reference to Figures 1 to 4, or Figure 9 of the accompanying drawings.

10. A combination of a one-piece thermoformed device according to any one of Claims 1 to 9, with an article to which the thermoformed device affords shock-protection, wherein the thermoformed device is fitted to the article with individual portions of the article engaged within the channels of respective wings of the thermoformed device.

11. The combination according to Claim 10 of a one-piece thermoformed device with an article, wherein the thermoformed device is fitted to a respective corner of the article to afford shock-protection to that corner.

12. The combination according to Claim 10 or Claim 11 of a one-piece thermoformed device with an article, wherein the

combination includes one or more additional one-piece thermoformed devices each according to any one of Claims 1 to 9 for affording shock-protection to the article, and wherein each of the one or more additional thermoformed devices is fitted to the article with individual portions of the article engaged within the channels of respective wings of that additional thermoformed device.

13. The combination according to Claim 12 of a one-piece thermoformed device with an article, wherein the one or more additional thermoformed devices are fitted to respective corners of the article to afford shock-protection to those corners.

14. The combination of one-piece thermoformed packaging devices with an article to afford the article shock-protection, substantially as hereinbefore described with reference to Figures 5 to 8, or Figure 10 of the accompanying drawings.